FEBRUARY 24, 1958

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Construction: One Bright Spot

1958's $49 billion will top 1957's $47 billion despite dip in industrial building . . . Page 35

Licensing: A Road to Profit

Product licenses can give you diversification, added income from unused patents . . . Page 46

Shell Molds Add to Steel's Uses

Close tolerance castings have smooth surface, can be toughened by heat treatment . . . Page 70

Beating the Cost Crisis

A tankmaker saves 66 per cent by switching from manual to automatic welding . . . Page 72

Structural Steel Aplenty Now

Why the fast shift in availability? . . . Page 111

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We welcome inquiries

We are specialists in the custom-building of the types of gears shown here. We make them in quantity to your specifications.

Manufacturers who want that kind of wide specialization—and who are looking for a company that can serve as a "gear department" are indeed invited to write or phone. The answer will be prompt.

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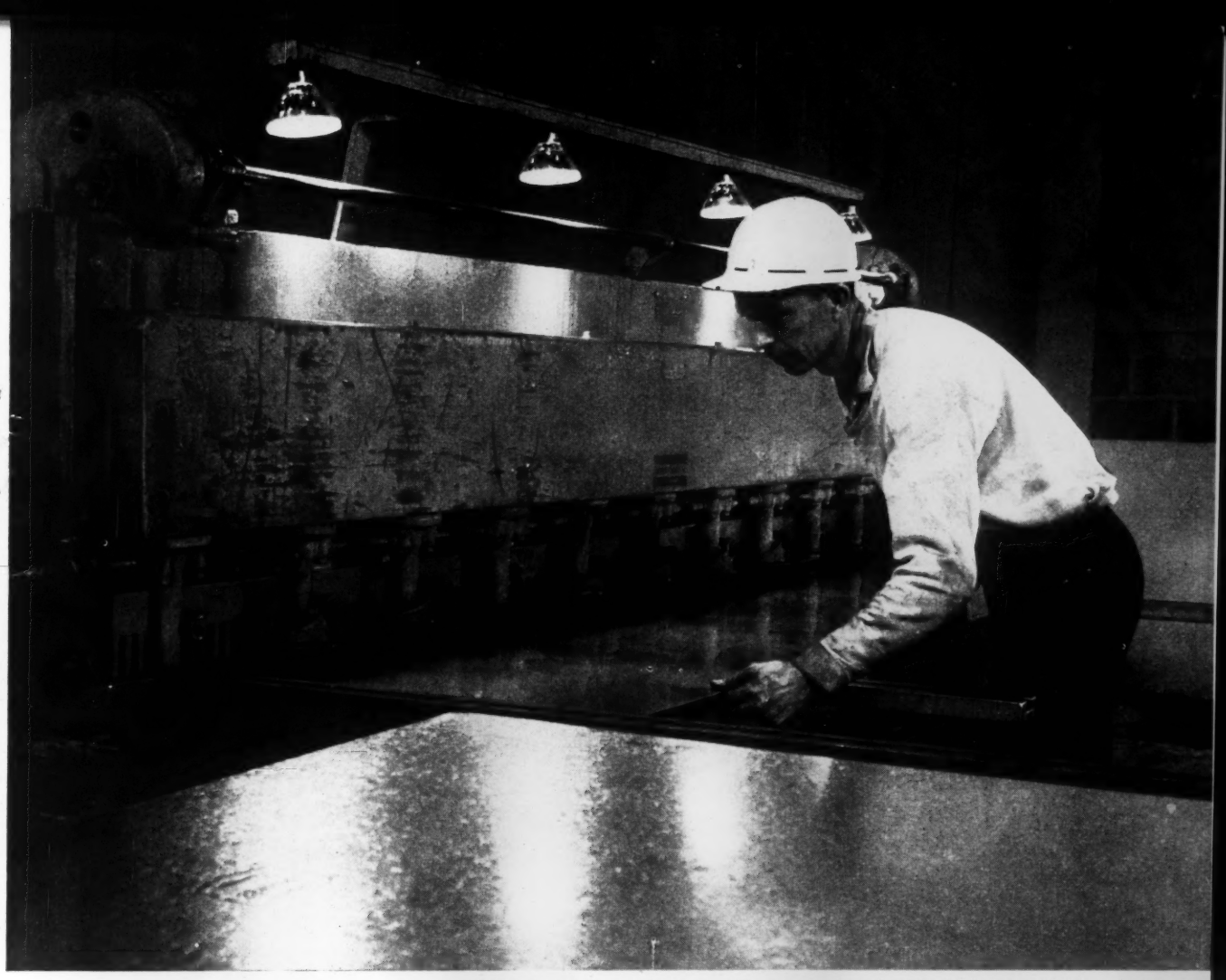

Cutting sheets to proper size is one of the many services offered by distributors of Bethlehem products.

"TWENTY-FOUR HOURS," *the Distributor Promised*

Down in Crisfield, Md., Charles D. Briddell, Inc., is well known to the crabbing industry for the excellent machinery it builds. Recently the shop was working at top speed to turn out a crab-picking machine for a good customer. A steel angle of special size was needed to complete the job—and because of unusual circumstances, the shop didn't have one immediately available.

Charles Briddell, president of the company, phoned a Baltimore steel-products distributor. Quickly he explained his situation. "We'll have you fixed up in 24 hours," the distributor promised.

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HERE'S WHAT THE DISTRIBUTOR OFFERS YOU. Bethlehem sheets, bars, shapes, plates, tool steel, and other products are stocked by distributors in all parts of the country. Stocks are carefully selected to meet the needs of the areas served. But the distributor offers you more than a warehouse full of steel. He's equipped to perform such services as cutting, sawing, slitting, and other types of processing—always on very short notice. He's geared for fast delivery!

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Charles Briddell, Crisfield, Md. His company builds unusual machines for a specialized industry, and also manufactures an excellent line of cutlery.

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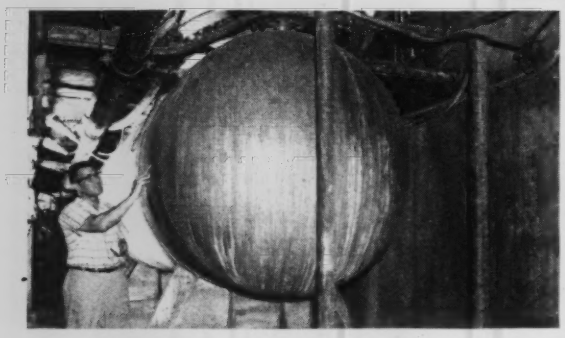
Giant autoclave *is divided into six inner compartments, each with a turbine impeller for agitating slurry, which contains cobalt, nickel, copper arsenic, iron and sulfuric acid, and iron-arsenic compounds. The reaction is carried out at pressures of 550-600 psi, at temperatures exceeding 400°F. The Calera Mining installation, at Garfield, Utah, was engineered by Chemical Construction Corporation.*



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in corrosive slurry that quickly kills other metals

THIS encrusted, scale-covered turbine impeller made from Mallory-Sharon titanium is a thing of beauty to the cost-conscious Calera Mining Company. It's passing inspection after four years service in as corrosive an environment as you are likely to meet.

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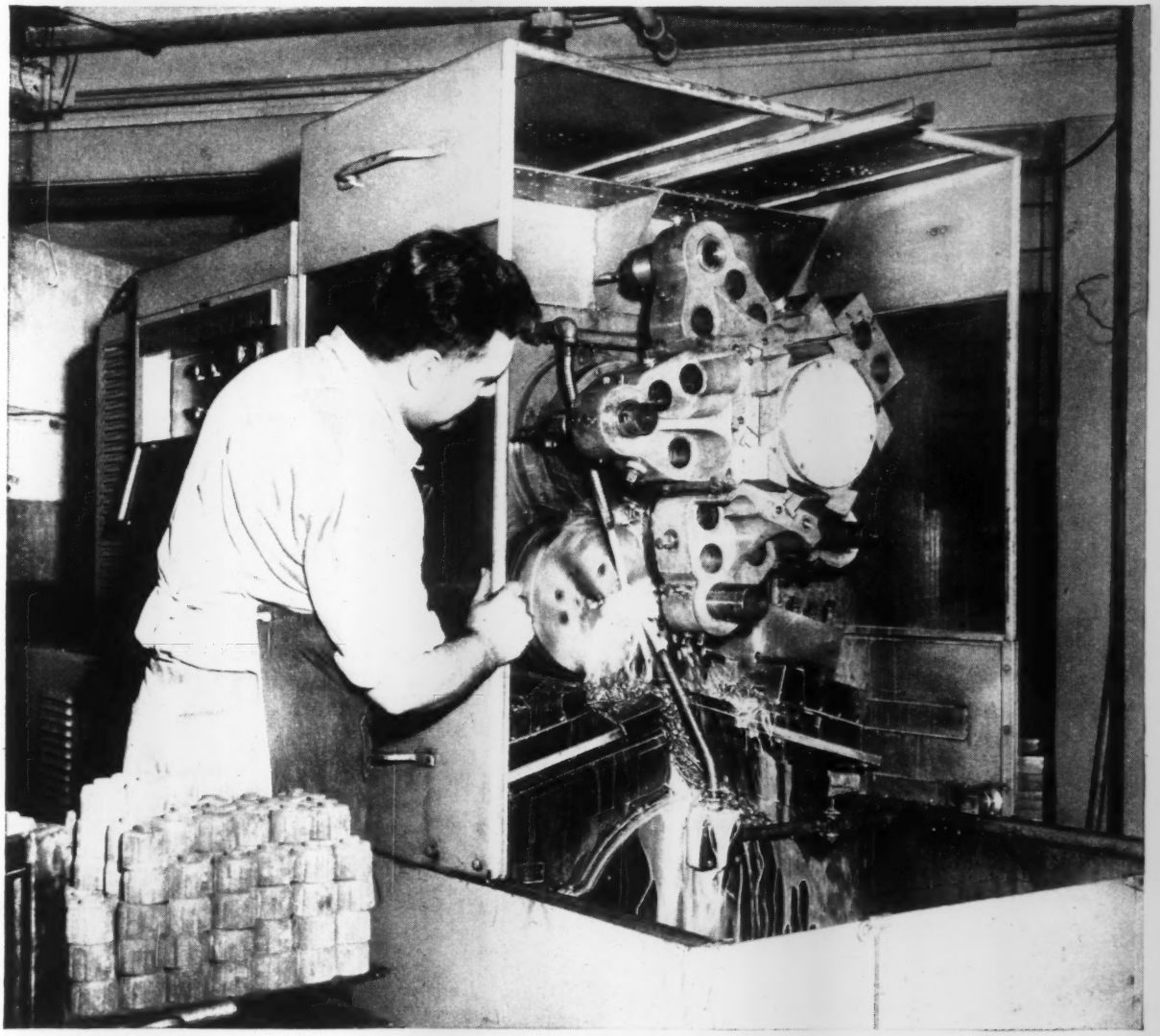

At Thew Shovel...

This Warner & Swasey Single Spindle Chucking Automatic paid for itself with one year's savings! It machined both cast and forged steel parts for Lorain power shovels and cranes.

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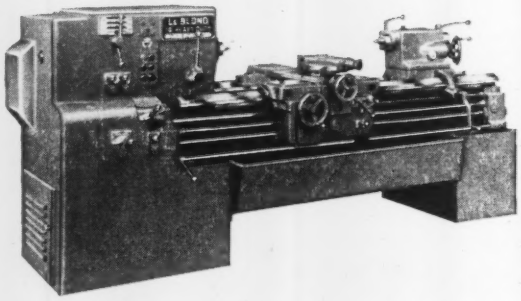

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World's Largest Builder of A Complete Line of Lathes for More Than 71 Years

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The Metalworking Weekly

February 24, 1958
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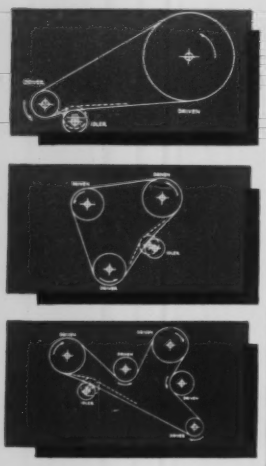

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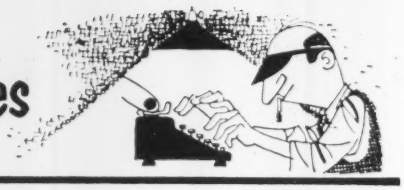
behind the scenes



Who's Zoo on Steel

G. MacF. Tuttle and H. Glenn Canary joined STEEL's staff as assistant editors last week. Mr. Tuttle is a graduate of Baldwin-Wallace College and has confessed that he taught school for a spell. Mr. Canary attended Ohio State University and did a stretch in Massillon, Ohio, as a reporter for the *Evening Independent*. He explained that his name was originally Scottish, and was spelled "Kenarie," but when his ancestors arrived in Kentucky, they adopted the casual spelling of the frontier, and as a direct result of this attitude, they all became Canaries. Perhaps this was an old southern custom, because a number of Virginians, too, were Byrds.

Shortly after the new assistant editors had settled behind their typewriters, Steve the elevator operator, remarked that STEEL was beginning to resemble a zoo. "What I mean is, you have Dick BIRDSONG, Glenn CANARY, and Austin BRANT . . ."

"Brant? Hold on there. How does he qualify?"

"You're no bird watcher, I can see that," said Steve. "A brant is a goose." Steve warmed to his subject as he added: "Then in the animal family we have Cal FISHER —that's a creature in the weasel family. And we have Ed FRANKE."

"Wait a minute. *Franke?*"

"Hot dog, stupid. Then we have TUTTLE . . ." he gave us a withering glance ". . . I suppose you never heard of tuttle soup?"

Helping Each Other

Licensing products is a big deal for large and small companies these days. When Chicago Editor Bill Dean received the assignment to do a story on this subject (The How and What of Product Licensing—Page 46), he looked on it as a routine matter. His interest grew when investigations revealed case histories of successful licensing arrangements, including some foreign deals that have paid off either in Europe or America. Your interest will grow, too, when you read the story. Suppose you have an airtight patent on a three-legged carpet tack, but your business is primarily the production of dental drills. If you don't feel like manufacturing the tacks, permit another company to turn them out. You escape all the headaches and latch on to an extra income as well.

Essentially, that's what it amounts to. However, there are other interesting angles. Small companies that can't afford the expense of research and development can apply to large companies and ask for manufacturing permits. Large companies that own idle patents can hire them out and pocket those royalties.

THIS IS CORNELL TYPE

It is fairly safe to assume that when you let your eye fall on this page (isn't that a revolting expression?) you gathered that it was set in 9 point Ideal type. Well, friends, that used to be true. Beginning with the Feb. 10 issue, however, STEEL came out in 10 point Cornell type. The Cornell is a little larger, a little cleaner, a little shaplier, and a little easier on the bifocal set. Between ourselves, type is type; so long as you can read it, there is not much point in debating it. You can set the word "cat" in literally hundreds of different type faces, ranging from Adonis to Wedding Text, and if you like it better in Bulmer Italic than in Nicholas Cochin, that's your affair. But then, change is inherent in progress. If this weren't so, we might be printing STEEL in cuneiform on clay tablets.

This page and New Literature (Page 105) are set in 8 point Cornell. Market prices are set in 5½ point Ideal. Our advertisers may, and do, use any type they please, including runic, dactylographs, and reproductions of birchbark paintings.

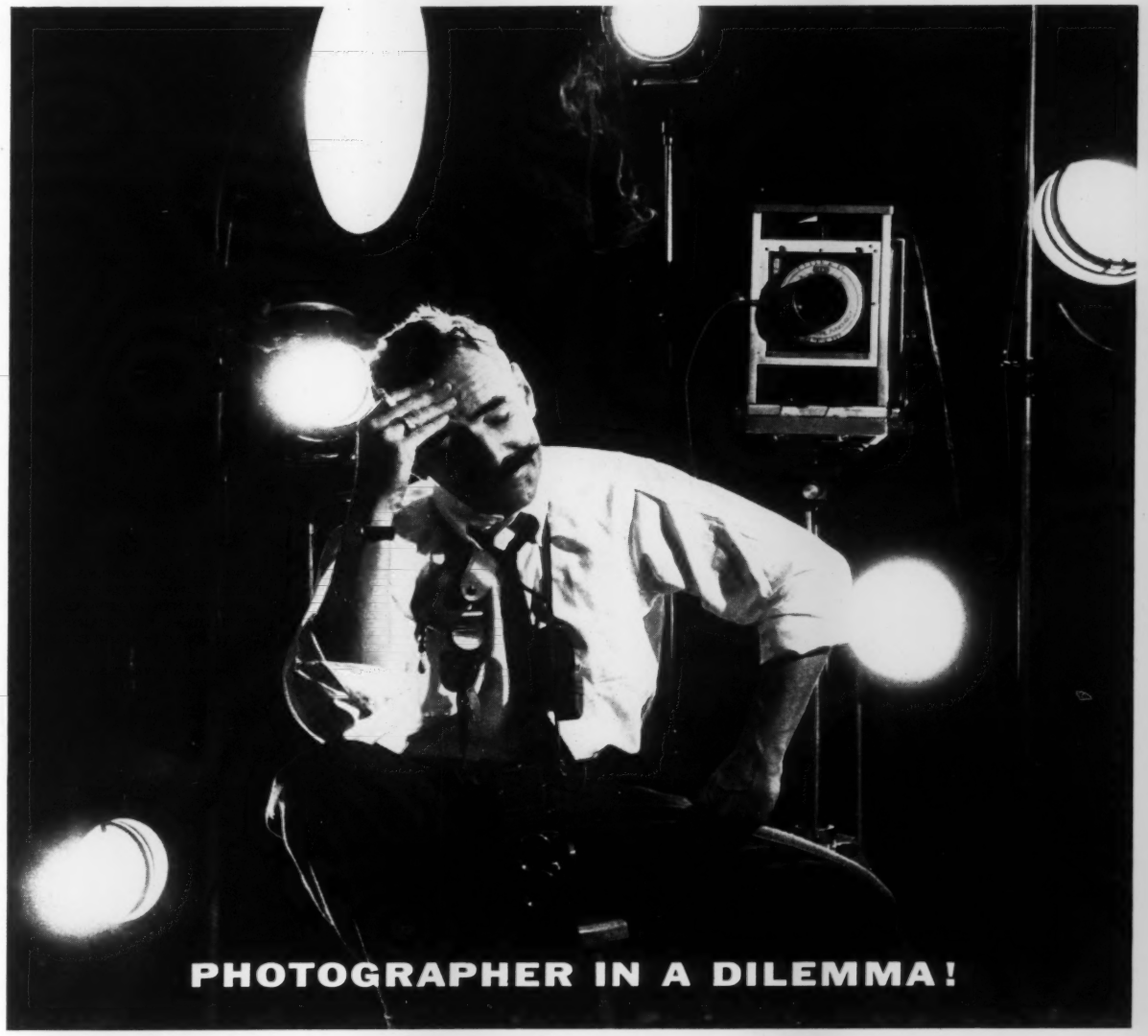
Off-Course Flight

Eddie Shaw and Don Brodie, Bell Helicopter Corp., Ft. Worth, Tex., stirred up a respectable commotion with their cigaret puzzle (STEEL, Feb. 3). Assuming that the answer they included is correct (don't ask us how to solve it; we only work here), then never have so many persons been so wrong so many ways. The Bell boys resolve it this way: Brown, 3 Old Golds; Perkins, 15 Chesterfields; Turner, 8 Kools; Jones, 20 Luckies; Riley, 6 Camels. Richard Raper, assistant general manager, Wheeling Steel Corp., Steelcrete Factory, was the only correspondent who arrived at this answer. Even he admitted that variations were possible. He included an old puzzle which we shall run soon.

You're supposed to do this one in your head. A mixed-up golden plover left Nova Scotia for South America but got confused in the fog. He flew in an easterly direction for 300 miles, changed his mind when he sighted icebergs, then flapped 250 miles in a southerly direction, where he met a seagull who told him that he was 400 miles due east of his starting point. What was the compass course of the first leg of his flight?

Shrdlu

(Metalworking Outlook—Page 29)



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That's why we say: when Federal Ball Bearings are part of so many things you *use*, shouldn't they be part of the things you *make?*

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the man who needs a new machine tool is already paying for it

Out-of-this-World Accuracy

Whether they're destined to go "out of this world" or not, many jobs demand some "out of this world" machining. Here's one, on a J & L lathe which is adapted for two-way tracing from the hexagon turret. Critical dimensions on both internal and external tapers, plus several intricate contours are finish-machined in one chucking.

A three-way indexing template holder is push-button controlled. Thus, down-time for template changes is eliminated, and the 180° tracer continues to machine on both the forward and return feed of the saddle carriage.

A single selector switch disengages the tracing unit and the machine is ready for normal* turret lathe operations.

*("Normal" for J & L turret lathes means unsurpassed accuracy, high production, and low, low maintenance.) For details, write for our descriptive folder No. 5425. Jones & Lamson Machine Company, 517 Clinton St., Springfield, Vermont.

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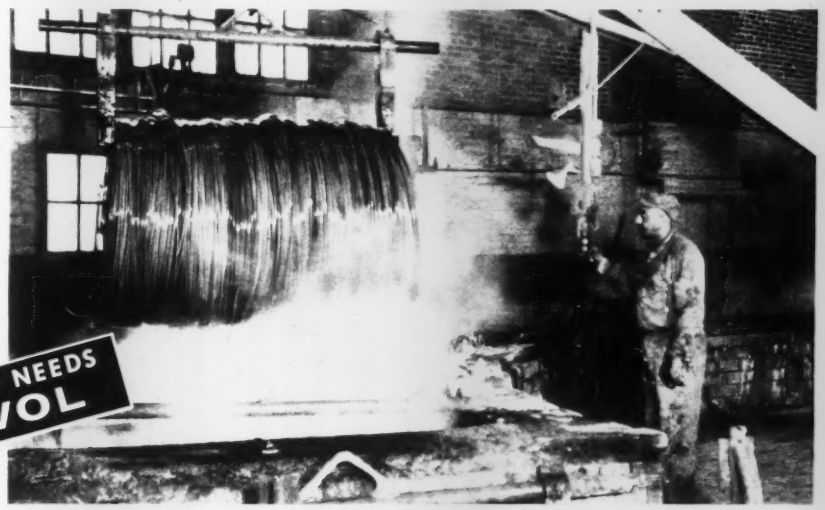

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LETTERS TO THE EDITORS

Article To Benefit Plant

Please send two copies of the article, "The Cost Crisis: How To Beat It" (Feb. 3, Page 103). I feel it may be of some benefit to our plant.

J. K. Carnes
Vice President-Mfg.
Globe-Wernicke Co.
Cincinnati

Would it be possible to get several copies? We want to furnish it to our executive personnel.

W. E. Walpole
President
Walbro Corp.
Cass City, Mich.

Editorial: Excellent and Timely

Your editorial, "It's Time for Sensible Selling!" (Dec. 30, Page 23), is excellent and timely. Many companies are learning the hard way that "it's time for sensible selling."

Howard M. Palmer
Vice President & General Sales Manager
Lewis-Shepard Products Inc.
Watertown, Mass.

Red Tape Holds Missiles Back

Your article, "Solving the Missile Mess" (Feb. 3, Page 63), may help some to solve the problem of how to cut the red tape, but it was written with far too little punch.

Little business needs some real help.

One item that the article did not touch on was "terminations." The experience of a company with missile red tape is only a pale pink if it has not been subjected to such proceedings.

If the recounting of our experience in vainly attempting to settle termination proceedings will be of any help in turning the tape from red to black, we will be happy to provide the facts.

Lawrence F. Megow
General Manager of
Fabricated Steel Products Div.
Hahn & Clay
Houston

Article Is Most Provocative

Your article, "Powdered Metal Parts Gain" (Feb. 3, Page 73), is most provocative. However, I must take exception to one statement which can be interpreted as having been made by MPA—that metals "most frequently used today are iron, copper, brass, bronze, alloy steels, aluminum, and titanium." That is not so.

Aluminum and titanium at this time

(Please turn to Page 12)

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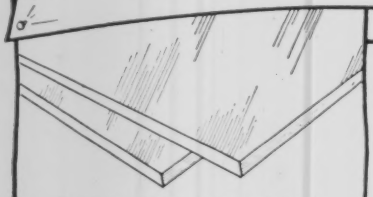

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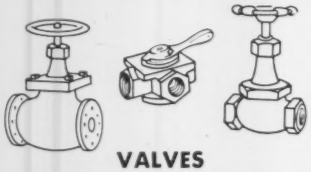
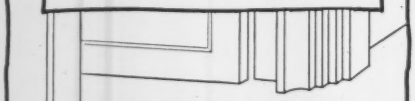


VALVES

All major types are available from stock in Aluminum, Inconel, Monel, Nickel and Stainless Steel (and plastics, too). Write for descriptive literature.



ARCHITECTURAL SHAPES

Copings, gravel stops and door saddles are just a few of more than two hundred Alcoa aluminum shapes available off the shelf, and illustrated in booklet titled "Shapes." Monel, Stainless and Copper roofing items complete the Whitehead line of architectural materials on hand.

These "Plus Items" and many more are available in addition to a wide selection of corrosion-resistant sheet, rod and tube.

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LETTERS

(Concluded from Page 10)

find minor application in powder metallurgy. Both hold promise, but it is erroneous to assume that they are among the "most frequently used today."

One encouraging aspect not brought out in your report is recognition by the industry of the importance of education and promotion as means of expanding the market for their products.

Through co-operative efforts under the direction of MPA, the powder producers and the custom fabricators are exhibiting at national trade shows, preparing publications, and in other ways acquainting the engineering public with the facts about powder metallurgy and how best to take advantage of the process.

Kempton H. Roll
Executive Secretary
Metal Powder Association
New York

Prospects Far from Glowing

I glanced through STEEL last evening and saw your article, "The Tool Outlook for '58" (Feb. 3, Page 66), which, while it is rather sad, is certainly expertly done.

We agree with you that the prospects for the machine tool industry in 1958 are far from glowing. However, I do feel that before this year is out, there must be some changes which will be largely government-directed and could change this machine tool situation.

The machine tool industry is one of the stops along our lifeline. Unless we keep it up to date and in good condition, we will certainly not remain competitive with the rest of the world.

Carl L. Hecker
Executive Vice President
Oliver Corp.
Chicago

Requests Feb. 3 Issue

I would appreciate a copy of your Feb. 3 issue. Having heard many complimentary discussions on its articles, I am sure I would find it interesting.

Byron Galbraith
Superintendent, Plastic Tools
Arvin Industries Inc.
Columbus, Ind.

Seeks Further Information

We noticed the item, "Standards for Pumps," in your Technical Outlook column of Jan. 13 (Page 69). Please give us the address of the American Standards Association so that we might secure further information.

Earl Scarborough
Maddox Foundry & Machine Works
Archer, Fla.

• *The address is: 70 E. 45th St., New York 17, N. Y.*

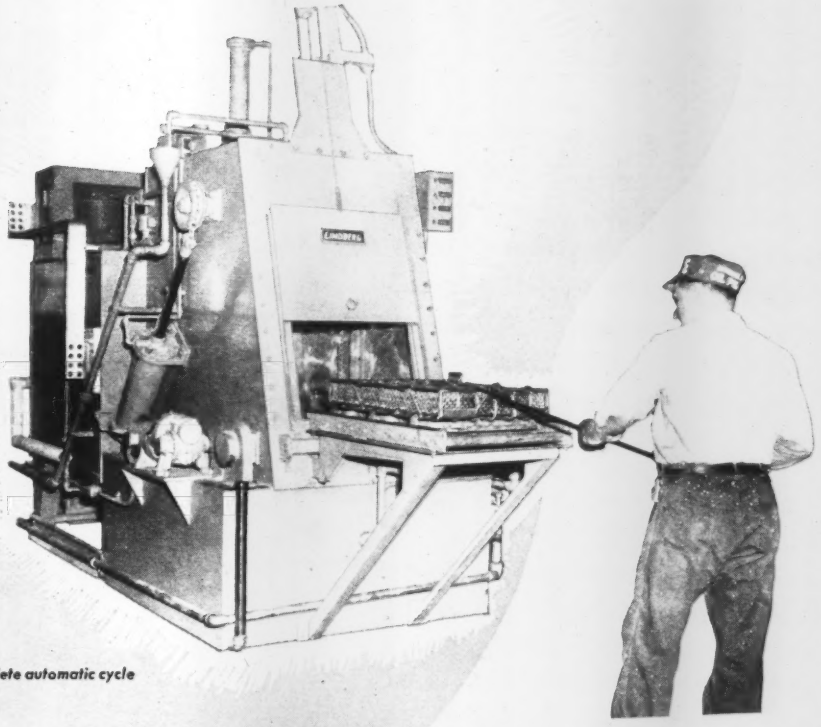
Reader To Frame Illustrations

Kindly send me two copies of the article, "How To Get More from Machine Tools" (Sept. 23 insert). I plan on framing the colored illustrations (Chip Colors —What They Tell and Chip Forms—What They Tell) and placing them in the manufacturing bay in our shop.

R. J. Seibert
Tool Engineer
P & H Harnischfeger Corp.
Escanaba, Mich.

Here's the work-horse

for many a carbonitriding job



*This furnace has **complete automatic cycle** and quench control.*

This is the most widely-used carbonitriding furnace of all. Day in and **day out production** of tons and tons of work has proved this furnace's **ability to increase** production quality and volume and reduce costs. It **is a versatile** furnace, too, not only for carbonitriding but for other uses, carburizing, annealing, carbon restoration and many hardening applications.

This type of furnace is available for both manual and automatic operation. It can be equipped either with Lindberg's efficient new vertical radiant tubes for fuel-firing or for electric heating with Lindberg's revolutionary new CORRTHERM element.

Versatile as this furnace is, we don't claim it is the best solution to *every* carbonitriding problem. But, whatever your need may be, talk it over with Lindberg. Our engineers, as they have done in so many instances, will recommend a sound answer—design it, build it, even field-install it if you wish. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality. Lindberg Engineering Company, 2441 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California.

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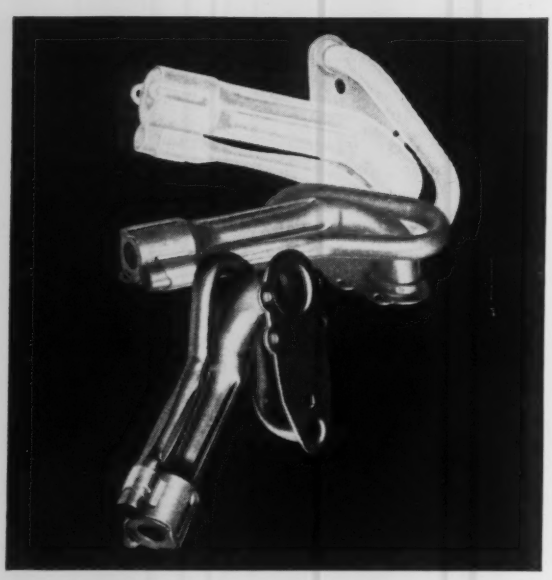
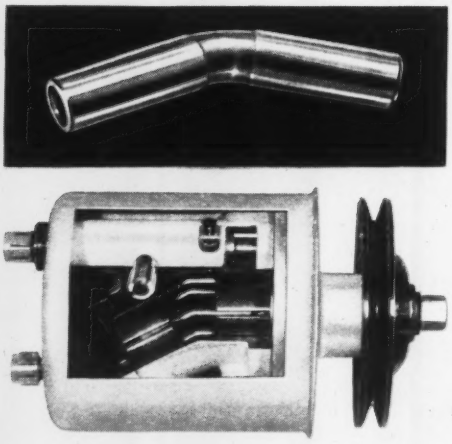


RANGE BURNER MANUFACTURER STEPS OUT with Republic ELECTRUNITE Mechanical Tubing. Harper-Wyman Company uses it in forming lightweight, easy-to-clean venturi burner tubes. The company subjects ELECTRUNITE to a hairpin bend of 1¼ diameter radius, then a four-way crimp, followed by punching, notching, and welding. Uniform, predictable ductility avoids stretch and collapse as tubing is severely bent and formed. Republic engineers will help you design ELECTRUNITE into your product to speed production, cut costs, and improve performance. Mail the coupon for facts. Or call your Republic representative.



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fabricates easily . . . economically . . . with uniformity

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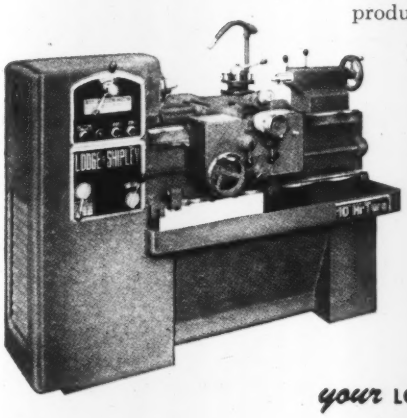
High speed turning, boring and facing are child's play . . . with the Lodge & Shipley HI-TURN Lathe. Whether on single or multiple-piece work, this 10″ Production Lathe provides productive capacity at a price substantially below conventional lathes.



Designed for fast, convenient operation, it eliminates rarely used features, incorporates many standard features never before found at any cost in a lathe of this size.

The 10″ HI-TURN gives you horsepower, rigidity and production you would normally expect to find in lathes costing twice as much. We can prove more production per lathe dollar . . . more production per operator hour!

Find out how the HI-TURN Lathe fits your turning requirements.

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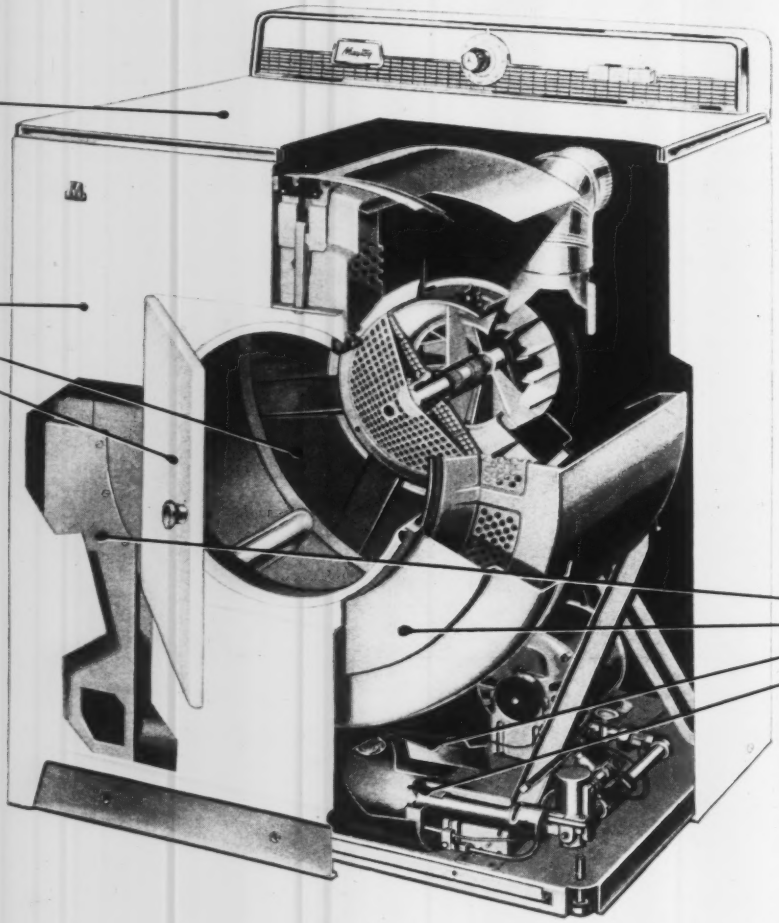
How 3 Durable Armco Steels

Here's where Maytag uses special Armco Steels to help insure top performance of new "Halo of Heat" gas dryer. Corresponding parts of the electric model are also made of these special grades.



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SHEFFIELD DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

in New Laundry Dryer

Fight Heat and Corrosion, Boost Efficiency

Three Special Armco Steels contribute greatly to durability and efficiency of new "Halo of Heat" dryers produced by The Maytag Company, Newton, Iowa.

Armco ALUMINIZED STEEL Type 1 is perfectly adapted for parts that must reflect or resist heat. The reason? It is steel hot-dip coated with aluminum by a special process. The aluminum coating reflects up to 80 per cent of the radiant heat that meets it. At the same time, this unique union of metals provides exceptional resistance to heat.

Armco ZINCGRIP® Steel assures complete protection for cabinet, drum, and door because its rust-resisting zinc coating does not flake or peel during fabrication. (Cabinet and door treated for painting by Maytag).

Armco Enameling Iron, with a durable, beautiful porcelain enamel finish, protects the top. This specially-processed enameling base resists sagging at all porcelain enamel firing temperatures. Enamel quality is better because it contains an extremely low percentage of gas-forming impurities.

Perhaps one of Armco's special steels can give *your* products powerful new sales advantages too. It's easy to find out. Just fill in and mail the coupon.

In addition to these three special steels, Armco produces stainless steels in a wide variety of forms, ALUMINIZED STEEL Type 2, ZINCGRIP PAINTGRIP®, Cold-Rolled PAINTGRIP, High-Strength Steels, Electrical Steels, Long Ternes, Steel Tubing, and top-quality Hot-Rolled and Cold-Rolled sheets.

ARMCO STEEL CORPORATION
1408 Curtis Street, Middletown, Ohio

SEND more information about these Armco Special Steels:

- ☐ ALUMINIZED STEEL Type 1
- ☐ ZINCGRIP Steel
- ☐ Enameling Iron
- ☐ Others _____
- ☐ We make _____

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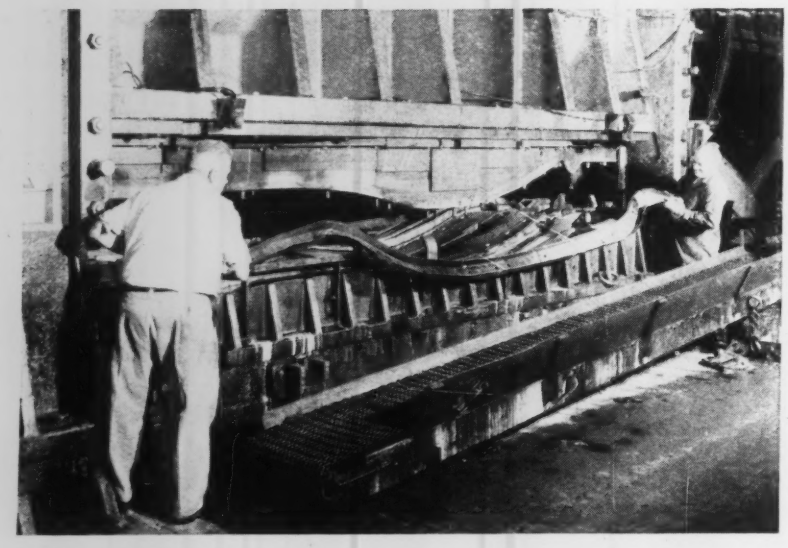
Twelve different types of frames for one automaker alone are fabricated from Pittsburgh Steel Company sheet in the Detroit Division of Dana Corporation. Here completed frames are moving to the paint shop.

Pittsburgh Steel sheet helps auto designers improve cars



Steel strip begins to look like the side-rail of an automobile frame. This big forming press forms the blank into half a side-rail section.

Improvements In Frames Demand Better And Better Steel

Formability of sheet steel is speeding production for a large manufacturer of auto frames.

At Dana Corporation's Detroit Division, where as many as 4,000 frames can be made in a single day, a unique forming operation has been developed which requires a high degree of this quality called formability.

Known as edgewise bending, the operation would be impossible without hot rolled sheet steel of top quality—like that supplied Dana Corporation by Pittsburgh Steel Company. Because sheet from Pittsburgh Steel has great formability it undergoes severe deformation without rippling, tearing or peeling.

This kind of formability is important to sheet users every-

(Advertisement)

where who process steel into finished products.

At Dana, cut lengths of sheet are sheared into strips which measure approximately 205 inches long for one standard type of auto frame. These blanks move through a specially-designed edgewise bending machine which holds each strip perfectly flat while pushing part of the strip against one edge. At the same time that two sections of the strip are being pushed edgewise a total of 13 inches, the remainder of the strip is held motionless and straight.

• **Kick-ups in Frames.** The result is two curved sections, one near each end of the strip. These curves give the finished frame the "kick-ups" over the wheels which allow modern cars to hug the road.

Edgewise bending replaced a process which required taking a much larger piece of steel and cutting out the desired curved shape, cookie-cutter fashion, with a high scrap yield.

Only the best sheet steel will take edgewise bending with the steel flowing smoothly into new shapes. That happens when steelmakers achieve just the right degree of formability while keeping steel's inherent toughness.

Consider what has happened in the making of auto frames alone to see how the automotive industry's demands resulted in better sheet steel.

Only five years ago, one of the best known makes of cars had only three standard frames. Now it has twelve. In the intervening years, frames have become 50 percent stronger. They're now made with more severe bends. They're wider and made of steel 40 percent thicker on the average. "Kick-ups" have become higher and higher.

• **Rigid Specifications.** Specifications for physical characteristics and grain structure became more rigid as frames underwent an increasing amount of shearing, punching, die and press work and welding.

Ever since Pittsburgh Steel Company entered the sheet market, its hot and cold rolled sheet has kept pace with the demands for steel that could take more and more deformation.

Whatever your use for sheet, you can benefit from the skilled know-how that has constantly improved the quality of Pittsburgh Steel sheet.

You'll benefit from increased formability that gives you faster, smoother production with fewer rejects. You'll gain, too, from steel of increased toughness. Start benefiting today by calling the nearest Pittsburgh Steel Company district sales office.

Edgewise bending of sheet steel strips is a unique operation at Dana. This machine pushes each strip into a curved section by holding part of it firm while pushing against the edges of other sections.

After edgewise bending, the steel strips are curved at each end. These curves will provide the "kick-ups" which are necessary for extra room over each wheel.

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How steam treating affects ferrous and non-ferrous metals

Use of steam atmosphere is nothing new to industrial processing but the benefits to be realized from its application in the heat treating of metals have only begun to be explored in the past few years . . . and are currently attracting an increasing amount of attention.

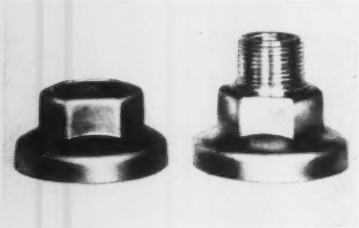
In scores of plants, working with both ferrous and non-ferrous metals, steam treating has proved an outstanding cost-cutter, according to F. L. Spangler, Application Engineer.

These trays of sewing machine parts are loaded for steam treating to give them a uniform, blue-black, wear-resistant finish. Since replacing the previously used bath method, steam treating has resulted in a 90% saving in direct labor and a reject problem has been eliminated.

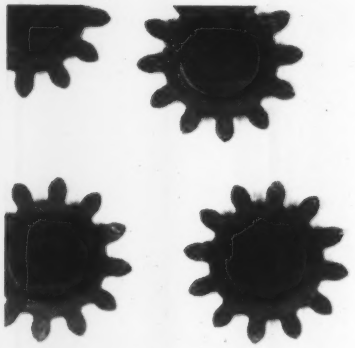
On high-speed steel cutting tools, for instance, it keeps tools sharp longer. Many drills, reamers, hobs, milling cutters, broaches, saws and similar tools hold their cutting edges 50 to 100% longer when steam treated after tempering and final grinding. This ratio goes up . . . often as high as 6 to 1 . . . when cutting such extra tough materials as alloyed structural steels.

On powdered iron parts, compressive strength and hardness increase appreciably. Tests of steam treated sintered compacts indicate that yield point under compression is twice that of a regular sintered compact.

To structural steel steam treating gives a uniform, corrosion-resistant, blue-black finish. When steam treating replaces chemical surface treatment, costs are usually 20 to 25% less . . . where it is used for stress relieving or tempering prior to machining or grinding, a shot or sand blasting operation can be eliminated.



These brass radiator steam-vent shells require nine draws and four anneals. Prior to use of a steam Homo furnace, a pickle was necessary after each anneal and a heavy pickle and buffing before final chrome plating. With steam treating the manufacturer has been able to eliminate all pickling . . . now uses only a bright dip and has substantially cut buffing time.



Powdered iron gears measuring 1⅛" in diameter were tested for hardness on a standard Rockwell machine, before and after steam treatment. After steam treating, ten parts tested showed an average increase in hardness of 45% on the gear teeth . . . 112% on gear hubs . . . and a 26% increase in compressive breaking load.

On gray iron castings steam seals microscopic porosity, improves resistance to wear and gives a high degree of corrosion resistance. Salt spray tests indicate that parts so treated stand up as well or better than cadmium plated ones.

Applied to non-ferrous metals . . . brasses, bronzes, beryllium copper, aluminum, etc. . . . it produces scale-free work ready for bright dip or use as-is. Within the past few years many manufacturers have substantially reduced and in some cases eliminated cleaning operations by stress-relieving, drawing, solution-treating or age-hardening in a steam atmosphere instead of air.

The equipment for this highly versatile heat treating method is safe and inexpensive... is ideal for installation directly in production lines.

A new 24 page catalog, *The Homo Method of Steam Atmosphere Heat Treating, gives details about application of the method to a variety of parts and materials. These specific instances may suggest ways in which this unique method can go to work for you to improve product quality . . . eliminate needless operations . . . reduce costs. Just write to Leeds and Northrup Company, 4957 Stenton Avenue, Philadelphia 44, Pennsylvania and ask for Catalog TD2-620(1).*

LEEDS Instruments **NORTHRUP** Automatic Controls • Furnaces

CALENDAR
OF MEETINGS

Feb. 24-26, Association of Iron & Steel Engineers: Western meeting, Hotel Statler, Los Angeles. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Feb. 26-28, American Management Association: Special general management conference, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Feb. 28-Mar. 1, American Society for Quality Control: Middle Atlantic conference, Hotel Statler, New York. Conference chairman: F. W. Kroll Jr., Esso Standard Oil Co., Box 222, Linden, N. J.

Mar. 2-6, American Society of Mechanical Engineers: Gas turbine power division conference and exhibit, Shoreham Hotel, Washington. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 3-5, American Management Association: Special finance conference, Statler Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Mar. 4-6, Society of Automotive Engineers: National passenger car, body, and materials meeting, Sheraton-Cadillac Hotel, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Mar. 9-11, American Machine Tool Distributors Association: Spring meeting, Roosevelt Hotel, New Orleans. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Mar. 10-14, National Association of Manufacturers: Institute of industrial relations, Hollywood Beach Hotel, Hollywood, Fla. Association's address: 2 E. 48th St., New York 17, N. Y. Information: Mrs. Sybyl S. Patterson, associate director, Industrial Relations Div., NAM.

Mar. 11-13, Instrument Society of America, Pittsburgh Section: Annual conference on instrumentation of the iron and steel industry, Roosevelt Hotel, Pittsburgh. Secretary: Frank K. Briggs, Atomic Power Div., Westinghouse Electric Corp., Large, Pa.

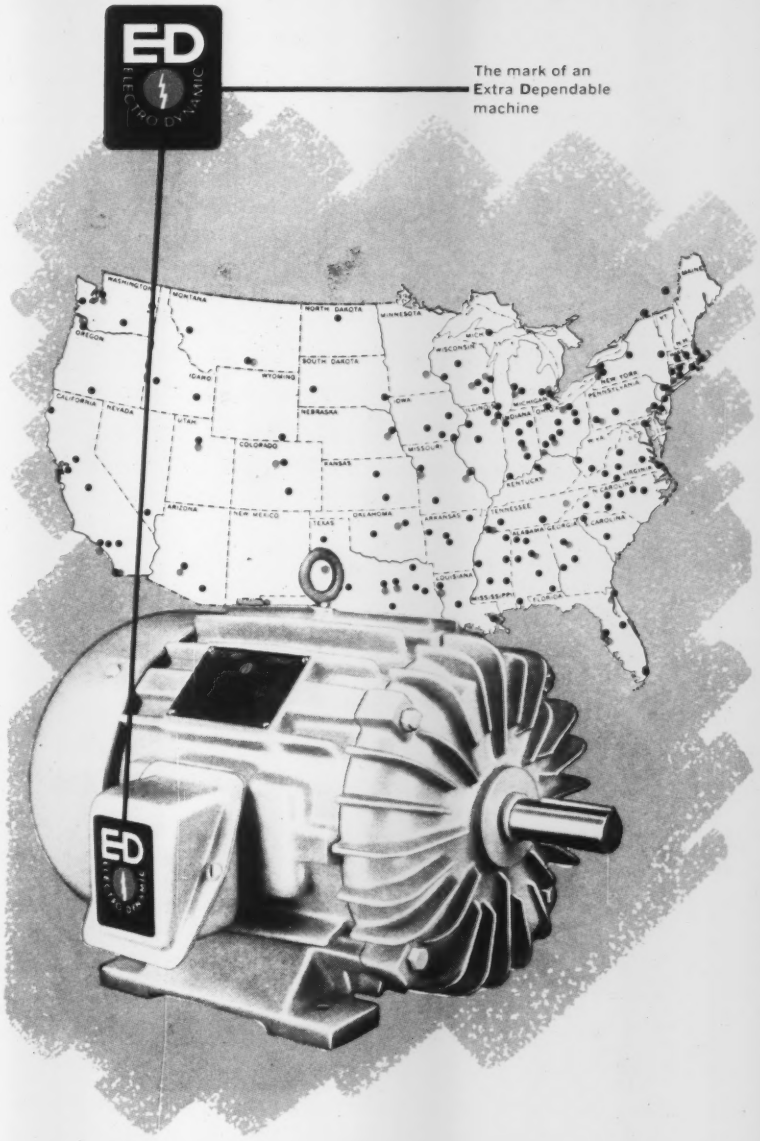
Mar. 12-14, Pressed Metal Institute: Annual spring technical meeting, Sheraton-Cadillac Hotel, Detroit. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold Daschner.

Mar. 15-18, National Association of Waste Material Dealers: Annual meeting, Waldorf-Astoria Hotel, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Managing director: Clinton M. White.

Mar. 17-19, Atomic Industrial Forum Inc., and National Industrial Conference Board Inc.: Joint atomic energy management conference, Palmer House, Chicago. Information: AIF, 3 E. 54th St., New York 22, N. Y., or NICB, 460 Park Ave., New York 22, N. Y.

Mar. 17-20, American Society of Mechanical Engineers: Aviation division conference, Statler-Hilton Hotel, Dallas. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 17-21, Nuclear Congress and Atomic Industry Trade Show: International Amphitheatre, Chicago. Information: International Atomic Exposition Inc., 12 S. 12th St., Philadelphia 7, Pa.



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there's an E.D. expert near you

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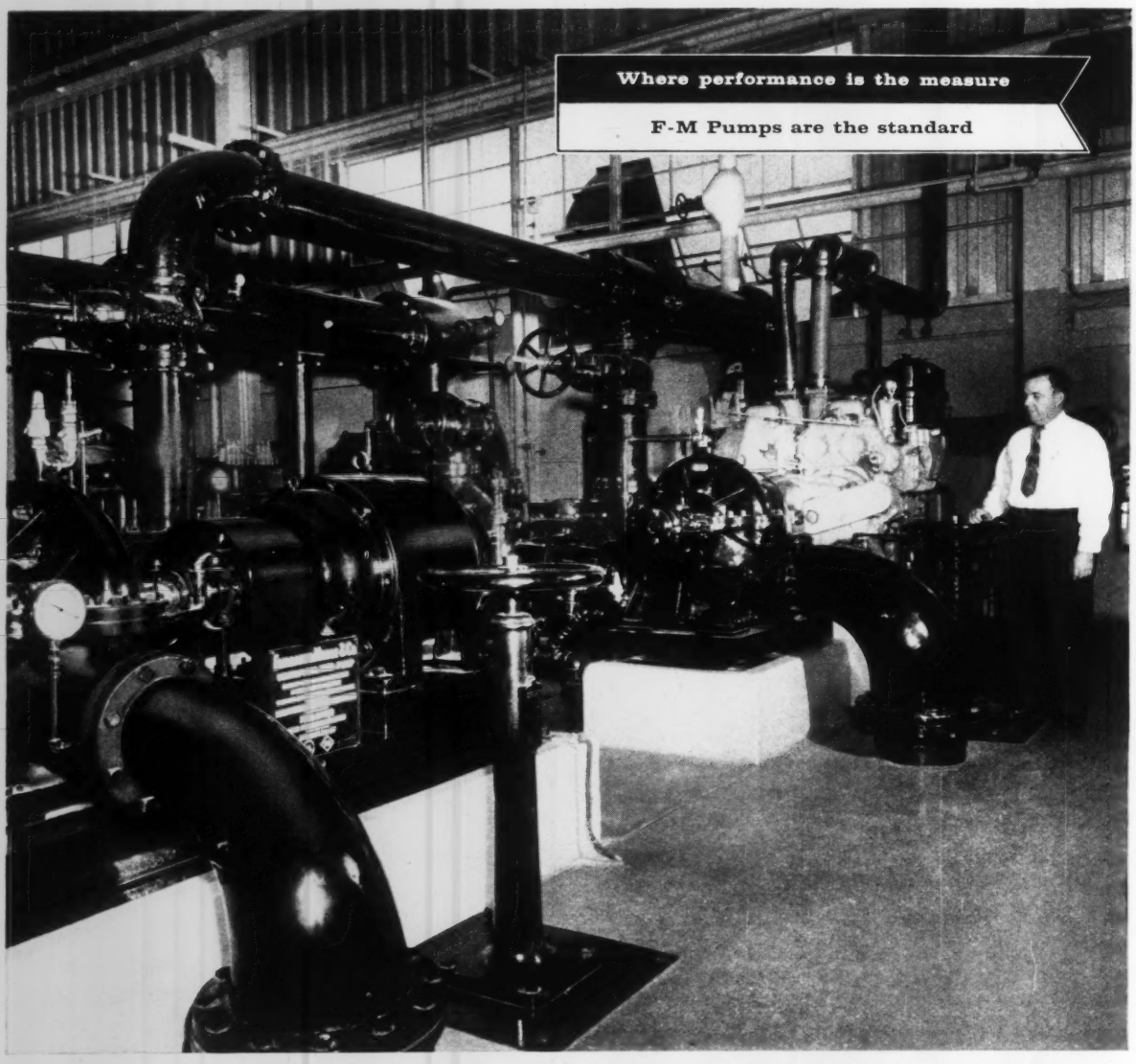

Mr. George Biggar, plant engineer of Ford Motor Company assembly plant at Mahwah, N. J., checks Fairbanks-Morse fire pumps (1500 gpm. motor-driven pump in foreground, 2500 gpm. diesel-driven pump near Mr. Biggar).

Ford guards against fire at giant new plant

To protect one of the world's largest auto assembly plants against fire, Ford Motor Company depends on these two Fairbanks-Morse fire pumps. As the heart of an extensive system, the two F-M pumps provide defense in depth, one pump backstopping the other.

This installation is typical of the great care and planning by modern industry to prevent the catastrophe of fire. Call in your F-M Sales Engineer for expert assistance in pump specification. As builder of the world's greatest variety of hydraulic combinations, Fairbanks-Morse will provide the exact type, exact size pump you need for maximum dependability.

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Ask for F-M Fire Pump Bulletins 5814F (horizontal) and 6920F (vertical).

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Resistance Welding Tank Cooling Fins

SCIAKY®

HELPS PUT PROFIT INTO MANUFACTURING

Sciaky Techniques Permit Adaptation of Standard Equipment to Automated Production

Automated seam welding is another Sciaky Resistance Welding Technique that can improve profit potential. And, the adaptation of *standard* equipment means that now profits increase faster because no huge expenditures are required for constructing "special" welders.

For example, the largest independent manufacturer of transformers in the world, Moloney Electric Co., St. Louis, Mo., automated the seam welding operations for their distribution transformer tanks by merely adding an automatic positioning fixture to a *standard* Sciaky Patented Three-Phase Resistance Welder.

Welding cooling fins to the tanks was originally a slow, costly arc welding job, and only one "L" shaped fin could be fastened at a time. Production requirements increased and fusion welding costs became prohibitive. As a result two standard Sciaky Longitudinal Seam Welders were installed to weld fins in "U" shaped pairs. Thus, Sciaky Resistance Welding Techniques increased production, and also improved tank design. Manual positioning of tanks and fins was adequate to meet production requirements at that time.

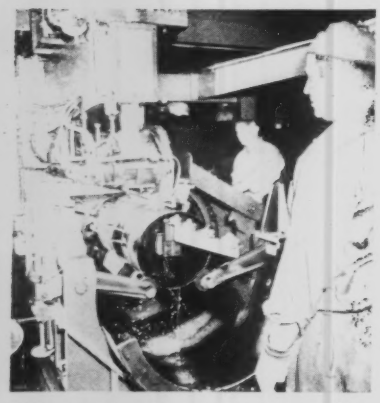

FIG. 2 After first weld cycle begins, electrode wheels progress down first fin as tank automatically indexes into throat of the welder. The tank then indexes radially for insertion of second fin, which is welded in position on return stroke of the tank back out of throat of the welder.

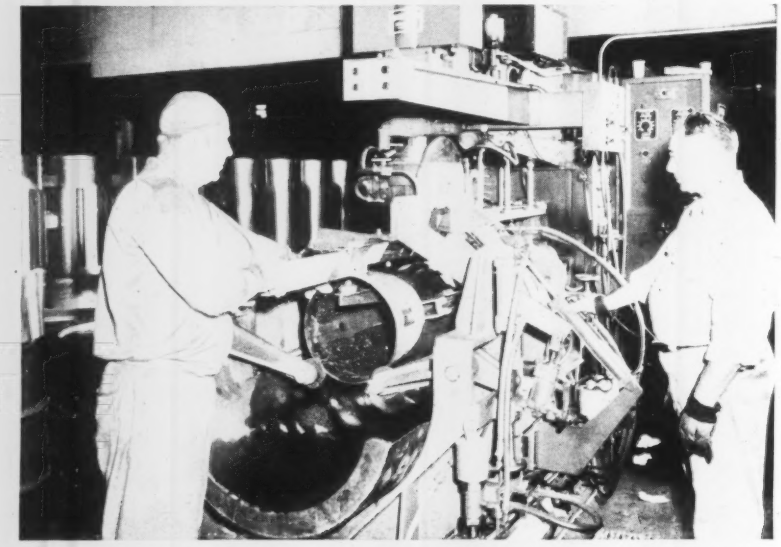

FIG. 1 After tank is loaded in automatic fixture, operator inserts first pair of "U" shaped fins in welding position. (Two brackets mounted on side of tank were joined in previous projection welding operations.)

Then, because of constantly rising materials and labor costs, Moloney faced the same "sliding profits" problem that confronts every manufacturer today. A research program was initiated to determine how to cut costs and improve manufacturing methods. This led them to study simple *automation* of the cooling fin and tank assembly operations.

Automatic Positioning Fixture

Sciaky engineers helped solve the problem with the new Sciaky Longitudinal Seam Welder equipped with special automatic fixturing. This automatic positioning fixture provides continuous, fool-proof seam welding of the cooling fins. A simple adjustment permits immediate change-over for various tank sizes, as well as radial spacing of fins.

This is how the *standard* Sciaky welder with automatic positioning fixture cuts manufacturing costs and increases production—all three operations are performed in one cycle . . .

(1) The machine welds one pair of cooling fins to the tank as it indexes into throat of welder.
(2) Positioner then indexes tank radially for the next seam welding operation.
(3) On return stroke, the machine seam welds the second fin.

Results

The Sciaky Patented Three-Phase Resistance Welder with automatic positioning fixture and two operators DOUBLED production over the previous method when two welders and four operators were required. The two previous machines and the extra two men were absorbed into other resistance welding operations.

Information Available

Case histories outlining the successful use of Sciaky Resistance Welding Techniques are available on request. Specific recommendations will be furnished on receipt of an outline of your requirements.

Write today, mentioning the information you would like to receive. No obligation. Sciaky Bros., Inc., 4909 W. 67th St., Chicago 38, Illinois. POrtsmouth 7-5600. 63D

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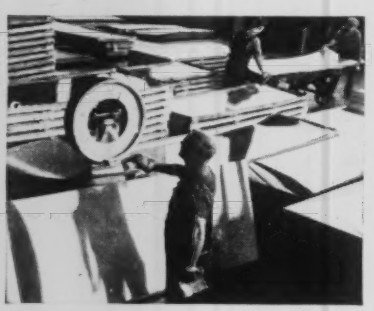
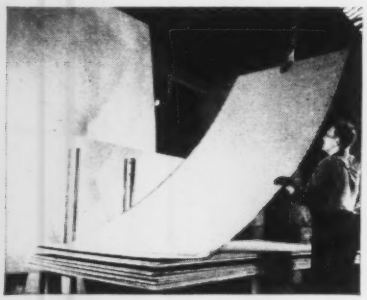
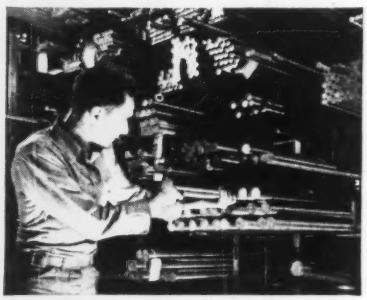


STAINLESS SHEETS—Eleven analyses of Allegheny stainless sheets, including nickel and straight chrome types. Extra wide sizes, also, to reduce welding costs. Expanded and perforated sheets.

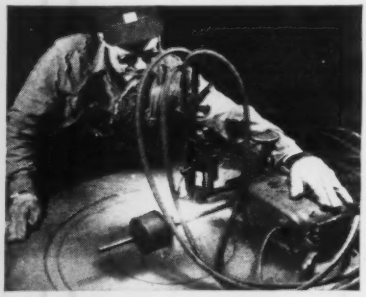


STAINLESS PLATES—Nine analyses, including plates to Atomic Energy Commission requirements and to ASTM specifications for code work. Also extra low carbon types for trouble-free welding.

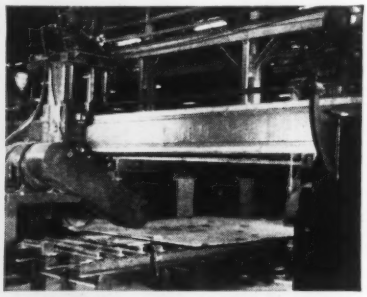


STAINLESS BARS AND ANGLES — Eight types, including rounds, squares, flats, hexagons and angles. Free-machining bars with both analysis and mechanical properties controlled for best performance.

STAINLESS PIPE AND TUBING—Light wall, standard and extra heavy pipe, ornamental and regular stainless tubing. Also screwed and welding fittings and Cooper stainless valves.



STAINLESS CIRCLES, RINGS, SPECIAL SHAPES—No matter how intricate, we can flame-cut practically any shape from stainless steel plate. One piece or a thousand.



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Soviet Metal Research Lacks Leadership

Russia's metallurgical research program lacks neither money nor manpower, but it is probably hampered by a shortage of top administrative people. "A few people hold several jobs each . . . they have a large role in determining the direction of effort for a large number of people and a large budgetary commitment," say Drs. J. H. Hollomon and Walter R. Hibbard Jr. The two General Electric Co. scientists (Dr. Hibbard is also president of the AIME's Metallurgical Society) found in a recent tour of Russia that steps are being taken to train more scientists for top management jobs, but in the interim, the Soviet research program will be short on planning and coordination.

Has the Engineering Shortage Ended?

The shortage of engineers will continue for at least 20 years, warns John K. Hodnette, executive vice president of Westinghouse Electric Corp. He charges that stories forecasting an abrupt end to the shortage are doing the country a disservice. Citing the electrical industry's continuing need for engineers, he predicts the U. S. will install more generating capacity in the next decade than it has in all previous years.

Needed: A Standardized Inch

It's high time that English speaking countries agreed on a standard measurement for the inch, says Louis Polk, president of Sheffield Corp., Dayton, Ohio. Reason: Present differences might impede the quick interchange of weapons and missiles. Although the inches used by the U. S., the U. K., and Canada differ by less than a hundred thousandth, missile manufacture now requires accuracy within 1 millionth.

NICB Surveys Dividend Policies

Continuity of dividend payment is more important than stability of the rate or size of the payment, say two-thirds of the 184 firms questioned by the National Industrial Conference Board, New York. Other survey findings: 57 per cent of the companies try to pay a fixed percentage of each year's earnings. Of the 43 per cent whose cash payments are flexible, most feel it's desirable to retain at least half of the earnings. About half of the survey participants issue stock dividends. Nine out of ten favor quarterly distributions.

Rebirth of the RFC?

Sen. Estes Kefauver (D., Tenn.) has called for: "The reconstitution of an agency similar to the Reconstruction Finance Corporation to supply capital for industry in areas where sufficient competition does not now exist." Citing the help given to Reynolds Metals Co. during World War II by the RFC, Senator Kefauver suggested a new program need not confine itself to small business but could lend money to medium and large firms, too. Watch

for the Democrats in this recession Congress to throw some weight behind the proposal.

Shot in the Arm for Construction?

A stimulus for construction is seen in an agreement signed at Miami, Fla., by the AFL-CIO building trades unions and the National Constructors Association. The pact calls for increased use of labor-saving machinery and elimination of waste resulting from featherbedding.

Pennsylvania Sweetens Its Bait

Some New York companies have been attracted to Pennsylvania, which set up a state-financed Industrial Development Authority to aid areas where unemployment is abnormally high. The authority lends money at 2 per cent to induce industrial growth where it is needed. Strings attached: Money is available only for areas in which 9 per cent of the labor force has been idle at least 18 months, or where at least 6 per cent has been unemployed for three years. The privately owned New York State Development Corp. has pretty much a free hand under its charter, but its interest rate is 6 per cent.

Ford Toys with Atomic Auto

Atomic-powered automobiles are not practical at the moment, but new developments in metallurgy and other branches of science could make them a reality sooner than a lot of people expect, says George W. Walker, Ford Motor Co. vice president and director of styling. His office has come up with a $\frac{3}{8}$ scale model, called the Nucleon, to probe possible influences of atomic power in cars. Envisioned is a power capsule suspended between twin booms at the rear. After 5000 miles or more, cars would be taken to recharging stations, which would largely replace gasoline service stations. The driver would select and control power output.

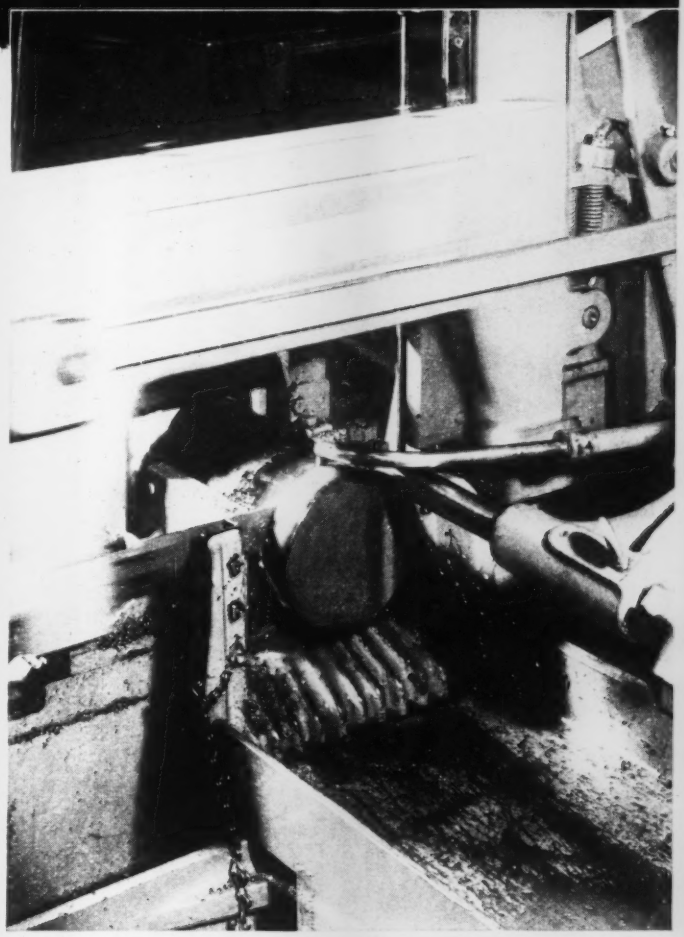
Service Emphasized as Equipment Orders Lag

Sign of the times . . . National Machinery Co., Tiffin, Ohio, is offering to rebuild or modernize its equipment now being used by customers. Plans: 1. Rebuild, replacing parts where necessary, restoring the original new-machine performance. 2. Modernize the equipment, installing new parts where required and incorporating design improvements such as higher speeds and capacities. Floyd M. Rueb, vice president and sales director, says the company has the production capacity to take on the rebuilding jobs. He feels it is an important customer service for those not in the market for new equipment but need machinery with higher performance ability.

Straws in the Wind

Colorado Fuel & Iron Corp. is recalling about 400 workers at Pueblo, Colo., in anticipation of seasonal pickups for rails, wire, and structurals . . . Average hourly earnings (excluding fringe benefits) of General Motors Corp. workers were $2.64 in 1957, up 16 cents from the previous high set in 1956 . . . Stockholders of Armco Steel Corp. and National Supply Co. will vote in April on a proposed merger . . . Tin container prices will go up about 2.3 per cent on Mar. 10.

5 Basic Reasons why MARVEL HACK SAWS CUT-OFF MORE ACCURATELY...



The consistently accurate performance of MARVEL Heavy Duty Hack Saws is no accident. MARVEL engineers knew, many years ago, that to produce and maintain accurate cutting-off, a hack saw must be designed and built like a fine machine tool.

Some of the basic design principles built into the modern MARVEL Hack Sawing System that makes it the most accurate cutting-off method you can use are:

1. V-Way Design...Greater Rigidity

Upright and Saddle are precision machined and fitted to form a rigid, integral unit capable of withstanding any cutting load with no deflection or side movement.

2. Anti-Friction Bearing Construction

Anti-friction ball or roller bearings are used at all load carrying points. Even the strongly braced saw frame reciprocates on heavy duty, fully enclosed preloaded ball bearings which provide permanent, frictionless rigidity and true-running, straight line cutting strokes.

3. Minimum Blade Frame Reach

Close-coupled design and crank lever action of MARVEL Saws keeps the saw frame and blade reach very short in relation to the vertical V-ways on which the unit is mounted. This insures optimum rigidity, even under the most severe operating conditions.

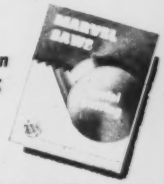
4. Positive Relief Blade Lift

On the return stroke, positive relief lift raises the blade to provide proper and "cushioned" lead-in on the next cutting stroke. This prolongs blade sharpness, life and accuracy.

5. Rigid Cutting Tool

Cutting-off accuracy requires a rigidly held, relatively short cutting tool. MARVEL Unbreakable High-Speed-Edge Hack Saw Blades, which combine a narrow high speed steel cutting edge permanently welded to a tough alloy steel body, can be tensioned from 200% to 300% more taut than ordinary blades. This provides a most rigid cutting edge.

Write for the MARVEL Catalog and the complete story on MARVEL METAL CUTTING SAWS



MARVEL Metal Cutting SAWS
Better Machines-Better Blades

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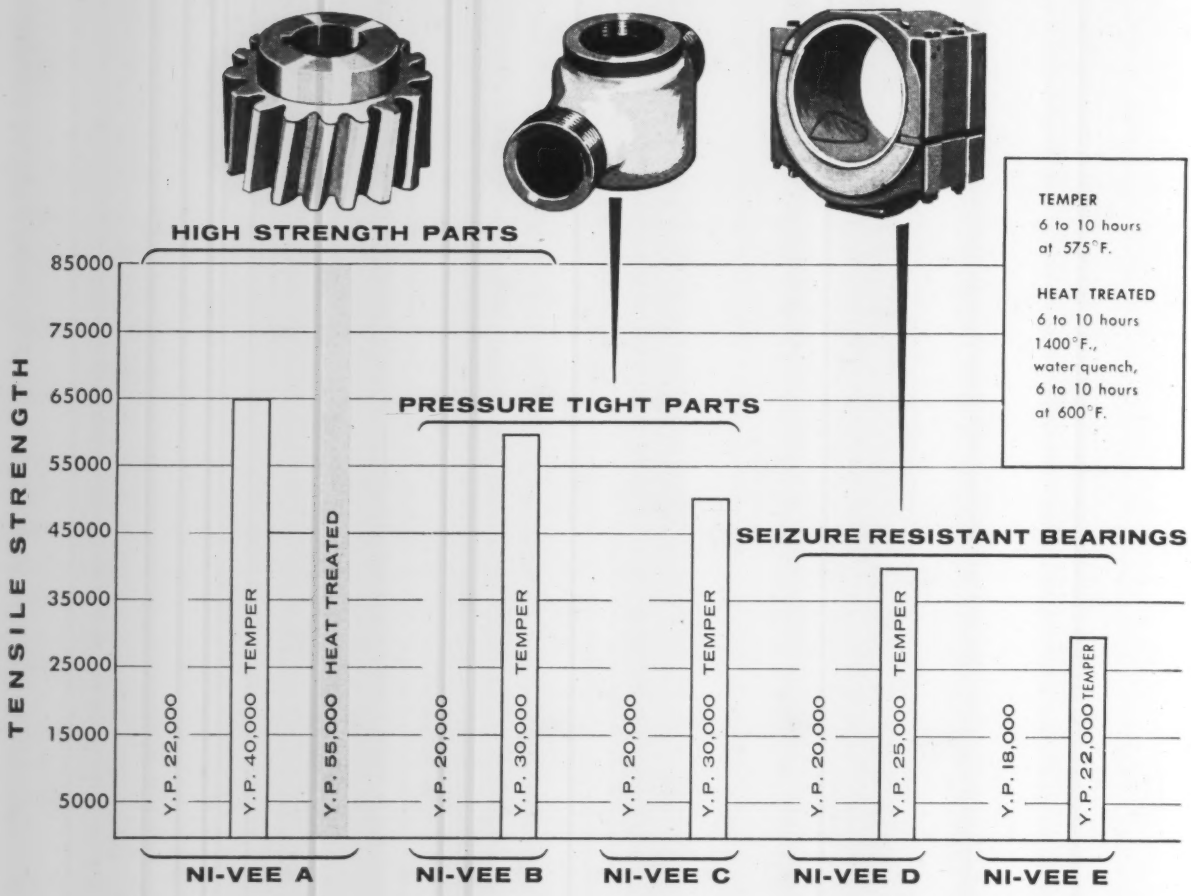
TYPICAL NI-VEE BRONZE PROPERTIES



5 high-performance bronzes

These versatile Ni-Vee alloys provide a range of properties that satisfies the requirements of most copper-base castings

The chart shows the range of tensile properties of the five Ni-Vee* bronzes and indicates the types of castings made with these alloys.

As you can see, you can satisfy the majority of your specifications for quality copper-base castings from among these five versatile Ni-Vee materials. Their "As Cast" mechanical properties – especially yield strength – surpass those of comparable G and leaded bronzes and red brasses.

The chart also shows what simple heat treatment does to step up their properties. Bear in mind that values taken from the chart are typical. In practice, higher values can be obtained.

Ni-Vee extras

You can expect superior performance from all five Ni-Vee bronzes. For example. Ni-Vee B, C, D, and E (the leaded group) can be used for castings of all three classifications shown. Ni-Vee A provides extreme strength. Ni-Vee E gives you extreme resistance against galling or seizure. The low zinc group (Ni-Vee A, B, D and E) show little tendency to dezincify, insure top-notch resistance to stress corrosion. All five, of course, have the excellent general corrosion resistance of copper reinforced by a 5% nickel 5% tin content.

Helpful booklet gives complete information on Ni-Vee bronzes

"Engineering Properties and Applications of Ni-Vee Bronzes" covers tables of composition, charts on deformation, friction, fatigue, elevated temperature service, electrical resistivity, wear and other engineering data. Write for your copy today.

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NI-VEE BRONZES
NICKEL ALLOYS PERFORM BETTER LONGER

Let's Think Clearly

One of the most disturbing things about the current economic situation is the loose—and often emotional—thinking that is finding such wide expression via the press, the air, the economic dopesheets, the speaking platform, and the luncheon table.

Several brands of gloom are being peddled by these people with responsible and influential positions in labor, management, finance, and government, as well as those who profess to be economists.

Labor says we are in the same trouble as we were in 1929 for the reason that productive capacity has increased faster than the purchasing power of the people.

Management says the labor unions, with unprecedented monopoly power, have forced wage costs so high they far outstrip the increase in productivity. Profits are caught in the squeeze.

Bankers say that the adjustment problems the economy faces today are the aftermath of the inflationary excesses that got ahead of us last year.

Government people say that March should mark the beginning of the end of the downturn and that the country will again be prosperous by November.

Economists say that the boom "topped out" in July, 1957, and that the recession will "bottom out" around midyear. Then the economy will be on the way up again.

Too often, such economic analyses and cures are designed to promote selfish interests by capturing public attention and sympathy. The effect is to compound the confusion about what's happening rather than explain it.

Just as these people differ with each other today, their own forecasts and interpretations have changed drastically. Last year, many people were painting a glowing picture of this country's future growth and prosperity, the need for more plant capacity to provide for an expanding population, higher standards of living, and the shorter workweek to provide more leisure.

All that optimism gave way to talk about the perils of inflation, the need for credit restriction, overexpansion of capacity, inventory adjustments, and a high plateau economy moving sideways.

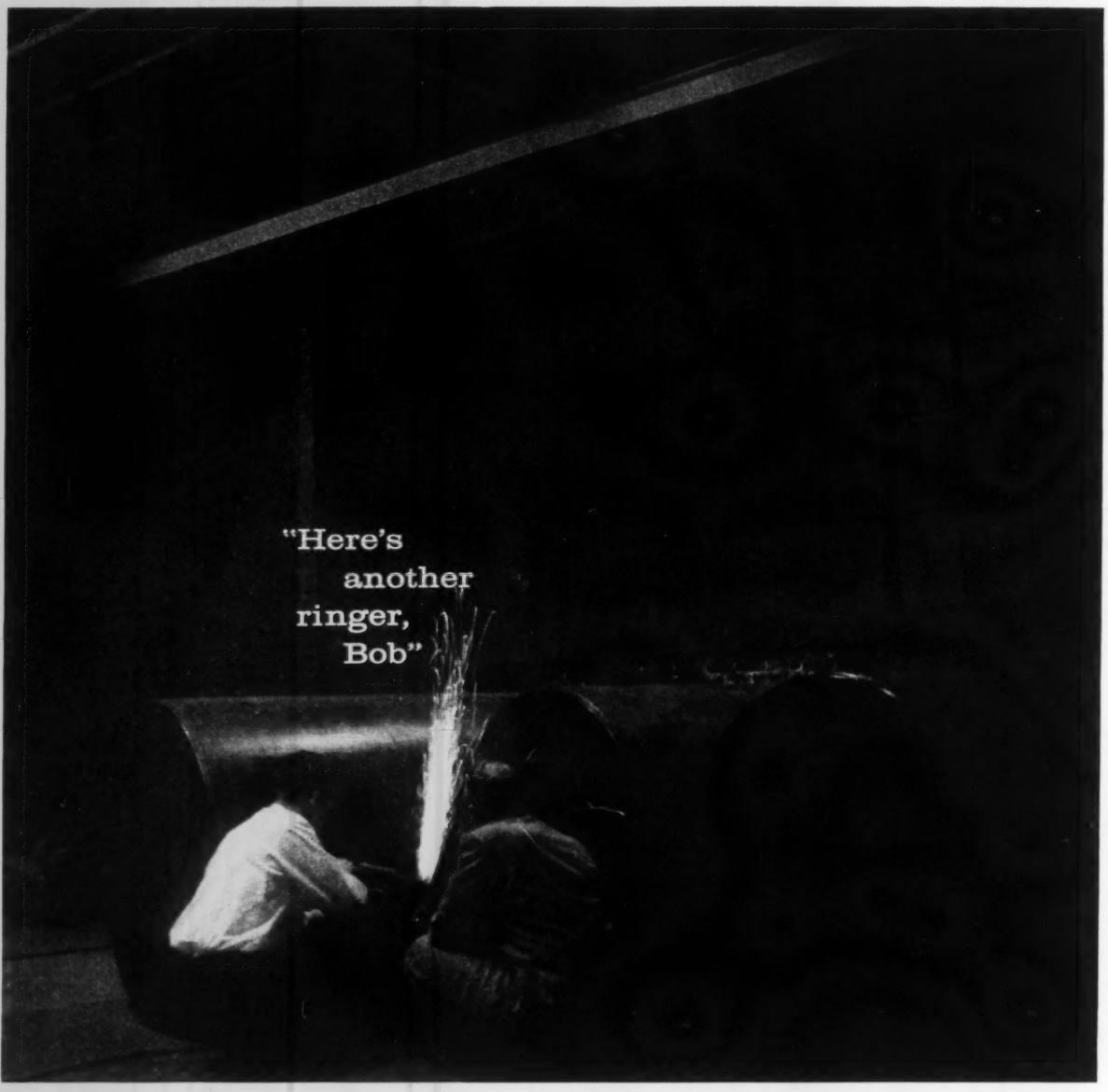
Now, many of the experts are convinced that we are in a genuine depression, and the game is to guesstimate when we will come out of it. No one has the clairvoyance to pinpoint the emergence from a dip in business.

What we need to do is take the facts at hand and apply them to our own business. There is no economic problem before us that can't be licked by a combination of smart planning, hard work, and real selling.

It's time to ignore the economic gobbledygook and start doing some clear thinking.

Irwin H. Such

EDITOR-IN-CHIEF



It was cold and dark in the shop that night. Everyone had gone but the foreman and Pete Clybourn, Inland mill representative, who was busy preventing a costly slowdown in production.

This company, a manufacturer of steel tanks, had run into some unforseen trouble. They had inadvertently used a few pieces of the wrong specification steel in the manufacture of a section for a quantity of tanks. But in which particular tanks, nobody knew.

About 3:15 that afternoon Pete had stopped by on another mission and the foreman had mentioned his problem. Pete immediately offered his services; then drove several miles across town to borrow a spark testing outfit. Back at the shop, it was well into the night before he finished testing the complete lot of tanks, in the process of which he uncovered three would-be troublemakers.

There are not many men today who can do the really competent job of spark testing that Pete did that night. We think it typifies a man who's conscientious, knowledgeable, thoughtful . . . the kind of man you're likely to meet when you do business with Inland.

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INLAND

Construction Outlook: $800 Billion Decade Ahead

(Work put in place in millions of current dollars)

	1957	1958	1967	% Change 1957-67
Total new construction	47,200	49,000	68,000	+ 44
Nonresidential	13,700	13,600	20,600	+ 50
Private industrial	3,200	2,800	5,300	+ 66
Private commercial	3,600	3,500	5,100	+ 42
Other Nonresidential	6,900	7,300	10,200	+ 48
Highway	4,840	5,800	9,200	+ 90
Residential	16,600	17,300	23,000	+ 39
Public utilities	5,800	6,200	8,200	+ 41
Military	1,300	1,200	1,300	0
Conservation	975	975	975	0
Farm	1,600	1,500	1,700	+ 6
Sewer & water	1,300	1,300	2,100	+ 6
All other new	1,085	1,125	925	− 1
Maintenance & repair	18,000	19,000	24,000	+ 33
Total	65,200	68,000	92,000	+ 41

Estimated by STEEL.

Building Bucks Recession

New construction should reach the $49-billion mark in 1958 —4 per cent above 1957's record. Easier credit and ample supply of structural steel will help

THE CONSTRUCTION industry seems to be immune to postwar recessions. It boosted its dollar volume in 1949, in 1954, and will do so again in 1958—this time by about 4 per cent—while continuing on its way to another record decade.

Besides serving as a stabilizer during adjustment periods, it has become an increasingly powerful force in the economy. In 1946, construction (including maintenance and repair) amounted to only 10 per cent of the gross national product. In 1951, the figure moved up to 13 per cent, and in the last two years, it reached 15 per cent. It will probably edge above that mark in 1958.

Of prime interest to metalworking: Private industrial construction did not live up to expectations last year and will take a substantial dip this year. But other areas of building (notably highways, schools and other public works, and private homes) will more than make up the difference (see table above). Here's a rundown on how 1958 looks:

Industrial—This year will see private industrial construction declining about 12 per cent from its 1957 level. It started tapering off after hitting a peak early last year. Many long range expansion programs have been completed, and others have been curtailed. Excess capacity will hold back new construction in many other fields.

Commercial — Many large suburban shopping centers started in previous years were completed in 1957, but new starts were on the decline. Outlays for other stores, restaurants, and garages are expected to stabilize at 1957 levels (after a sharp drop last year). The current low level of vacancies hints that construction of office buildings and warehouses will continue trending up (and a greater percentage may have metal walls). Total private commercial construction in 1958 will be within 95 per cent of 1957 volume.

Catalyst — School and hospital building will spearhead an expected 6 per cent increase in expenditures for other nonresidential structures in 1958. Spending in this category will tend to increase even more as federal, state, and local governments begin to take advantage of ample supplies of materials and manpower.

Producers of structural steel have caught up with demand and will keep up with it (see Page 111).

Highways—This year will bring the first noticeable improvement in the lagging highway program. STEEL estimates 1958 spending will exceed 1957's by 20 per cent (see STEEL, Feb. 17, p. 73).

Residential — Housing starts in 1958 are predicted at 1.1 million (vs. 1957's 1.039 million). Dollars spent for house building should increase by 4 to 5 per cent this year. A larger ratio of new homes may

be in the lower price bracket to attract more buyers into the market. This can be done without lowering costs or decreasing floor area: Many fringes, formerly included as standard equipment, may become optional.

Other Aids—Public utilities will continue building at a record rate to meet population growth and greater per capita use of their services. Their 1958 outlays will be about 7 per cent greater than those of 1957. The vital need for increased sewage and water facilities will help hold that group's spending at about $1.3 billion in 1958.

Golden Decade — The next ten years promise to be the brightest in the history of the building industry. Conservative estimates peg spending for construction (including maintenance and repair) in 1967 at $90 billion; some predictions range up to $100 billion.

Spearheading the uptrend will be highway, private industry, school, hospital, and other public building construction. Residential building outlays will rise about 40 per cent; so will spending by public utilities.

Indeed, it will be a golden decade for construction.

Nike Hercules Ready Soon

The Army's Nike Hercules missile system is rolling. Made by Douglas Aircraft Co., the Hercules carries high explosive or atomic warheads.

Nike Ajax bases are being adapted for both missiles. Conversion is expected to cost about 10 per cent of the original $14 million per site.

Hercules is larger and faster than Ajax. When carrying an atomic warhead, Hercules is designed to destroy entire enemy formations. It will be on guard in June at Chicago, Philadelphia, New York, and Washington-Baltimore.

Bearingmaker Adds Plant

Federal - Mogul - Bower Bearings Inc., Detroit, will start building a 23,000 sq ft plant at El Monte, Calif., this month. It will be completed by early spring. Cost of plant and equipment will exceed $500,000.

It will produce high precision miniature ball bearings for the electronics, missile, aircraft, and instrument industries.

Recovery Timetable

Upturn will come three or four months after we hit bottom, says Ford economist

"IF THE CURRENT recession is to be limited to the relatively mild proportions of 1948-49 and 1953-54, the rate of decline must decrease during the next few months and stabilize by midyear," says George P. Hitchings, manager of Ford Motor Co.'s economic analysis department, Dearborn, Mich. Mr. Hitchings told the American Management Association's marketing conference in New York: When the downswing is halted, three to four months of relative stability will follow before the economy starts up.

Cushions—Government attempts to help should be aimed at encouraging private spending through credit and tax policies, not through increased federal spending, says Mr. Hitchings.

He thinks that business can aid recovery with long term policies. What he has in mind: Inventories should not be cut below normal relationships with sales. Spending should not be reduced for such things as new product development, product and process improvement, expansion, and the replacement of outmoded facilities and equipment.

"Additions to capacity should be geared to the outlook for the early 1960s. The current decline has not dimmed its prospects," says Mr. Hitchings.

Market Notes—Compensation of marketing executives has gained only slightly in the last five years, Richard D. Crisp of Richard D. Crisp & Associates, Chicago, reported at another conference session. Median salaries: $7000-$9000 in small companies; $9000-$11,000 in medium-size companies; $13,000-$15,000 in large companies.

Good Sign for Appliances

Electrical appliance producers have a string of record years ahead, indicates a forecast by Detroit Edison Co. The giant utility estimates that the average residential customer will use 4800 kw-hr of electric energy in 1968, vs. 3114 in 1957 and 1641 in 1947. It forecasts the figure will be 6200 kw-hr by 1975.

One reason for the big increase, says the company, is the growing acceptance of electrical space heaters, air conditioners, and water heaters. It reports that 39 businesses and 891 homes in its area are heated solely by electricity.

Electrical use in Edison's 7600 sq mi area hit a record 12.56 billion kw-hr in 1957.

Backing up its optimistic forecasts, the company will spend $75 million on capital improvements this year. Largest project will be at the River Rouge Powerplant, where a 320,000 kw generating unit will be installed. Two 650,000 kw turbine-generators will be added at the St. Clair Powerplant.

Work will begin soon on a generating station to be operated on steam produced at the Enrico Fermi Atomic Powerplant, now under construction near Monroe, Mich. Power Reactor Development Co. is building the nuclear reactor there.

Generating equipment now on order will add 1,120,000 kw to the firm's current 3,101,000 kw of capacity. These additions are scheduled to be in operation by 1960.

NCR Boosts R&D Budget

National Cash Register Co., Dayton, Ohio, will spend about $36 million in 1958 on plant, equipment, research, and engineering. About $14 million will go for research and engineering, vs. only $2.5 million five years ago.

Payroll Record Set in '57

The U. S. iron and steel industry paid its employees a record $4,001,000,000 during 1957, according to the American Iron & Steel Institute.

The 1957 payroll was $205 million higher than the previous record, $3,795,975,000 in 1956.

The average hourly payroll cost last year was also higher than ever before, reaching $2.917. The previous record: $2.700 in 1956.

The industry's estimated employment during 1957 hit 656,700, compared with 653,400 in 1956. Wage earners worked an average of 37.2 hours per week in 1957, vs. 38.6 hours in 1956.

Because auto workers dread discharges like this . . .

UAW To Push Severance Pay

ALMOST LOST in the hubbub over Walter Reuther's profit-sharing plan for the auto industry is another demand that could cause far more trouble.

The United Auto Workers wants auto companies to grant severance pay and job transfer rights.

Up from Ranks—That's an issue rising from the union members, born because of their alarm over runaway plants. Union leaders won't dare drop it quickly. Many observers believe the profit proposal, artificially conceived at union headquarters, is just a bargaining gimmick and will be readily dropped when negotiations become serious.

Although the severance-transfer demand is aimed at giving relief to workers displaced because a plant is closed and a new one opened elsewhere, such a contract clause could be easily applied to any kind of severance or transfer.

Why the UAW Alarm?—Auto workers are worried about their industry's migration since World War II, particularly out of Michigan.

The exodus problem isn't confined to Michigan. Ford is closing its 27-year-old Buffalo assembly plant and transferring operations to a facility being built in Lorain, Ohio. The UAW Local 425 at Buffalo has won the right to represent workers at the new plant and is negotiating with the company on transfer benefits for those who are shifting and on severance arrangements for those who are not.

What To Do?—Situations like those breed the severance-transfer demand. "Sometimes you can't avoid moving," agrees Ray Vacha, director of industrial relations for the Associated Industries of Cleveland. A plant just wears out or becomes obsolete. Government contractors may be forced to move because of missilework or because the Pentagon insists on decentralizing. Foreign competition (in the bicycle and sewing machine industries, for example) may dictate shifts to cheaper labor areas.

Under such circumstances, most industrial relations experts believe the matter should be negotiated with the union on a case-by-case basis, as Ford is doing.

In the Contract?—"Try not to write transfer and severance clauses in your contracts," urges Mr. Vacha. "Good bargaining usually will keep your wage rates in line with your competitors'. Then, there is less likelihood of need to move away to find a lower-paid labor force. Watch out for unfounded rumors about plant moves. That's the quickest way to bring a demand for severance-transfer clauses."

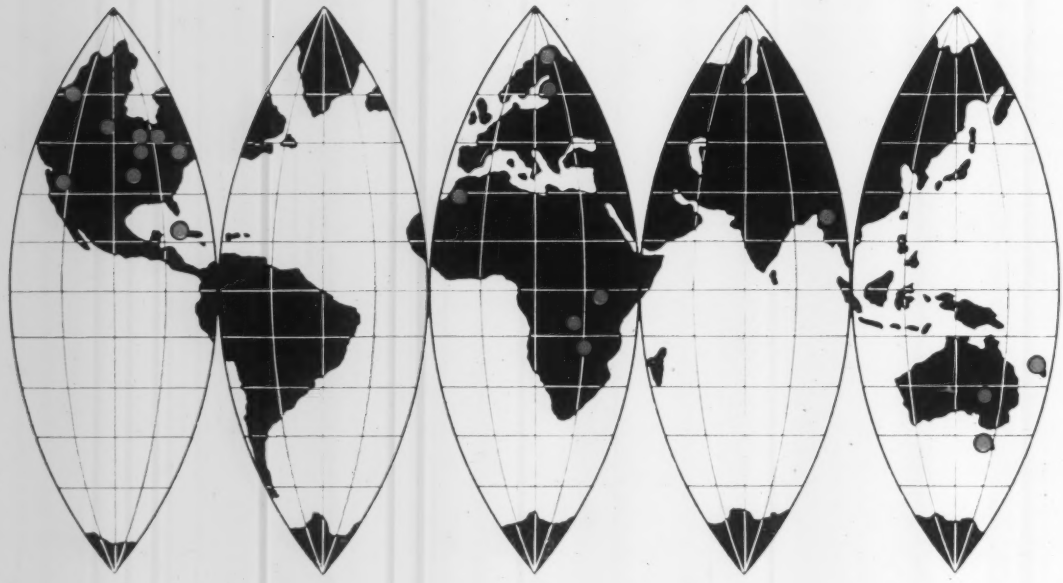
Managers of small and medium-sized plants, particularly, need to put more research and science into their bargaining efforts. Study your situation, negotiators advise. Meet your own area's rates and practices but don't go above them.

The Demand—The standard severance demand is for one week's pay for each year's seniority, with the limit at about five weeks' compensation. But arrangements run the gamut. At least one firm, City Auto Stamping Co., Toledo, Ohio, sets aside part of its Supplemental Unemployment Benefits fund for severance.

On the transfer matter, the union usually wants moving expenses paid and assurance that a comparable job will be provided at the new plant, with the same pay scales. If pay is the reason for moving, the least the union will demand is wages commensurate with others in the new area. Last, but most significant, the union will demand to represent the workers in the new plant.

The severance-transfer issue in 1958 will be confined largely to large and middle-sized companies, but if it wins a toehold there, it will start filtering throughout metalworking in coming years.

Areas Where Cobalt Is Mined



Cobalt Is Available

MANUFACTURERS have been reluctant to use cobalt and its alloys because of its reputation as a scarce metal and a shortage of sources where they could get information on it. The first barrier has been crossed (world production of cobalt is now double its rate of consumption), and a Cobalt Information Center has been set up at Battelle Memorial Institute, Columbus, Ohio, to help industry negotiate the second hurdle.

Wide use of cobalt alloys in aircraft and communication equipment caused a critical shortage immediately after World War II. It prompted a search for substitutes, the establishment of stockpiles, and encouragement of greater production. But some people still think the metal doesn't fit into long range plans because of the possibility that consumption may mushroom.

Availability—Although long term availability cannot be measured precisely, the Union Miniere du Haut-Katanga in the Belgian Congo estimates cobalt could be supplied for some 40 years at its present rate of production. It expects the development of copper deposits to stimulate more production. By the summer of 1959, new sources in Cuba are expected to be producing another 2200 short tons annually. Similar increases are expected from other sources.

Present Uses — Only a small amount of the pure metal is used commercially. It has been rolled as foil 0.0008 in. thick and drawn to wire (the form in which it's used as cobalt 60). It's an important constituent in: High temperature, wear, and corrosion resistant nonferrous alloys; permanent-magnet alloys; cemented carbides; and a number of miscellaneous alloys.

History—In 1946, some 270 tons of cobalt went into high temperature alloys for jet aircraft construction. By 1952, this use grew to 3200 tons annually. Concern over availability resulted in restricting the use of cobalt to essential applications. Outlook: Steadily increasing consumption in aircraft construction.

The use of cobalt in magnet steels became important when Alnico alloys came into prominence. From 1945 to 1950, companies manufacturing magnets were the most important tonnage consumers. Permanent magnets take the most. Only small amounts are used in soft magnetic materials with high permeability.

Other Uses — Cobalt may be added to high speed steels (5 to 12 per cent). Only about 10 per cent of these materials contain it. Research is aimed at maintaining high red hardness and improving toughness.

Cobalt is used in alloy and stainless steels because it imparts greater

U. S. Consumption of Cobalt

(Short tons)

1957	5,288*
1956	4,781
1955	4,870
1954	3,680
1953	5,370
1952	5,410
1951	4,960
1950	4,140
1945	2,300
1942	2,600

*Estimated by STEEL.
U. S. consumption, including national stockpiling, is estimated to be 65 per cent of world consumption.

strength at high temperatures, combines heat and wear resistance in some die steels, and provides heat and corrosion resistance at high temperatures.

It's also an element in certain alloys for specialty uses, such as dental and surgical equipment, spring alloys, alloys for filaments in electronic tubes, targets for x-ray tubes, pen points, phonograph needles, and pivots in precision instruments.

Research, Future Uses — Design engineers do not have sufficient data on cobalt-base and cobalt-containing materials, particularly for temperatures above 1600° F. They need more information on such things as high temperature wear and galling, short time strength, and high temperature creep.

High temperature magnet alloys (above 932° F) are needed for modern instrumentation. Cobalt alloys could be developed for this purpose. Commercial expansion could come from applications in which hot wear, nongalling properties, and thermal shock resistance are critical.

How Diversification Pays

Wheelabrator, once a supplier only to foundries, has added new products and customer industries. Results: Doubled sales, employment, plus 75 per cent increase in floor space

DIVERSIFICATION is paying off for Wheelabrator Corp. As a producer of equipment for foundries it used to be subject to the ups and downs of one industry.

A measure of its growth: Since 1950, dollar sales have more than doubled. Employment has virtually doubled, and floor space has increased almost 75 per cent. A five-year expansion plan was started in 1956.

Wheelabrator now has three divisions: General Products Div. (blast equipment), Abrasive Div., and Dust & Fume Control Div.

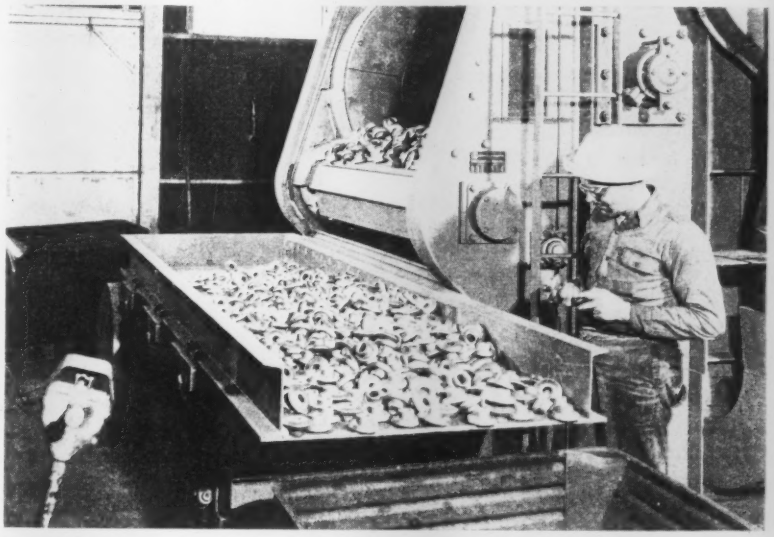
Markets Diversify—Blast cleaning equipment, perfected originally for foundries and still the company's leading product, now has wide application in a number of industries, including forging, heat treating, steelmaking, plastics, and steel drum reconditioning.

As sales and uses of cleaning equipment have expanded, the supplying of replacement parts has become a bigger and more important part of Wheelabrator's business. This volume is reasonably stable even though machines and parts have been improved through use of longer-life materials.

Shot Market—To help customers lower costs and improve cleaning efficiency, Wheelabrator does research on the abrasives used in the equipment it sells. In 1946, it developed and patented a method of making steel shot. The new product widened the applications for Wheelabrator equipment, particularly in descaling steel.

The shot was manufactured under license until 1952 when the company built its own producing plant. Wheelabrator says it is now the world's largest producer of steel abrasives and one of the largest producers of metallic shot.

Diversification Increasing — With the growth in steel shot demand, Wheelabrator set up a separate sales organization for abrasives, rec-



Originally designed for foundries, Wheelabrator Corp.'s Tumblast is used in many industries, including forging, steelmaking, and heat treating

ognizing the fundamental differences between selling capital equipment and supplies.

As another move toward diversification, seven years ago the company began to market the wet blast method of cleaning. It begins where dry blast cleaning stops. Finer abrasives are suspended in water to form a slurry. Principal applications: Finishing of forging, drawing, and diecasting dies; deburring; matte finishing (as a final finish or one prior to plating); and as an inspection tool (via scale removal).

Dust Control — Wheelabrator's Dust & Fume Div. also contributes to product diversification. It is favored by increased attention to clean air in municipal codes and the higher standards of industrial health and hygiene codes.

The company's first interest in dust control developed in the early 1920s when every blasting machine required a dust collector. But concentrated efforts in this field didn't come until after World War II.

A recent development, ultrafiltration, is a special adaptation of the dust collector used to filter air in powerplant motorrooms and industries where clean air is imperative. Wheelabrator is introducing wet-type collectors which will broaden the market for the company's equipment.

Verne E. Minich, now honorary chairman, established the firm in 1908 as Sand Mixing Machine Co. Its general office and factory are in Mishawaka, Ind.

Republic Expands Sintering

Republic Steel Corp. is spending $900,000 to expand sintering facilities at its Youngstown plant. When completed this summer, the addition will raise the monthly capacity of the sintering plant from 22,000 to 40,000 tons.

The steelmaker also plans to spend about $342,000 at its No. 3 electricweld tube mill for a skelp cleaner and two 16-in. cutoff machines.

Reynolds Ups Foil Capacity

Reynolds Metals Co. will spend $3 million to install 14 high-speed foil mills and companion equipment in its Louisville plants.

Osborn Mfg. Co.

This power brushing machine deburrs airplane gears 50 times faster than hand method previously used

Power Brushing Accelerates

Producers see their string of record sales years continuing. Salesmen report good results in searching out new uses as market for maintenance brushes lags

"THERE'S gold in them there bristles," asserted V. F. Miller, president, Mill-Rose Co., Cleveland, pointing to an item on his desk. He was referring to a tiny industrial brush with gold plated bristles which his firm produced for the electronics industry. Beside it lay power brushes made of tantalum and platinum.

He might have added that there is gold in that there business, too, for the infant power brush industry is well on its way to another record sales year. Setting records has become a habit for the seven firms which account for 95 per cent of the industry's dollar volume; they boosted sales an average of 11 per cent last year to an estimated $16 million total. They expect to duplicate that feat this year.

But it's not all gravy. "It takes

a lot of hard work to make money in this business," says James E. Bateman, president of Spiral Brushes Inc., Cleveland, whose sales climbed 20 per cent in 1957 and are expected to do the same this year. "We can't just sell our product; we have to sell the whole idea of industrial power brushing."

Buyers Everywhere—The key is in the versatility of the technique. Power brushes clean, polish, degrease, deburr, and buff a wide variety of items. Most of them are wheel-type. They're used in such diverse places as foundries and fisheries (cleaning shell molds and descaling fish). Main industry markets are automotive, aircraft, electrical, rubber, and glass.

Marketing Varies—Since most power brushes are tailor-made, firms sell the greater part of their production directly to the user; hardware jobbers and manufacturers' agents play a lesser role. Spiral sells 25 per cent of its volume through other brush companies. Mill-Rose markets most of its production that way.

Helping Markets Grow—Brushmakers see good potential for stainless steel brushes in the nuclear and missile industries. But one large producer cautions: "Missiles with moving parts are good markets, but brush uses are currently limited on many of the newer missiles. However, the industry is developing new materials and techniques for edge blending, burr removal, and surface refinement that will enlarge our place in that field."

Surface finishing of metal for appearance and prior to plating or anodizing is growing. M. V. Joy, Fuller Brush Co., Hartford, Conn., reports: "Cleaning the inside of tubes and deburring ends are still hand scarfing operations in many plants. But these jobs are now being turned over to power brushes which save time and do a better job." He adds that woodworking firms are a growing market.

Many Materials—About 70 per cent of power brushes are made of high carbon steel, about 10 per cent are ferrous and nonferrous alloys, and the remainder are tampico, nylon, and other fibers.

Machinery—Major power brush producers also make brushing machinery, using a building block concept. One firm reports that 75 per cent of its machines are standard with special attachments or refinements; the other 25 per cent are unique designs. Brushes are also used in drill presses, turret lathes, centerless grinders, and power hand tools. Brushes mounted on portable air tools do many cleaning jobs.

Exports-Imports—Ohio Brush Co., Cleveland, is a large producer of power brush kits. The home do-it-yourselfer is the biggest buyer. Joseph S. Gardner, general manager, reports competition from Japan and Germany in the kit field is increasing on both seaboards. Some U. S. firms buy foreign brushes and make them up into kits for resale.

Brushmakers, in general, note mounting foreign competition in the export market. Often, the U. S. company cannot meet the foreign producer's price because of the difference in labor costs. Tariffs and import restrictions are also barriers. Osborn Mfg. Co., Cleveland, has licensed an English firm to use its brushmaking patents.

Outlook—Says Osborn's manager of industrial sales, F. T. Turner: "This year looks good from here on out. January's sales increased over December's; February's will show a bigger gain over January's. We look for general business conditions to improve, and we're finding new applications rapidly."

Says Mr. Joy: "Since sales of maintenance brushes are lagging, salesmen are digging harder to find new power brush applications—with good results. Fuller expects a 15 per cent improvement in sales this year."

Consensus: Brushmakers expect to continue breaking sales records for quite some time. As one producer puts it: "Industry has only just begun to exploit the uses of our products."

Byers Adds a Wrought Iron

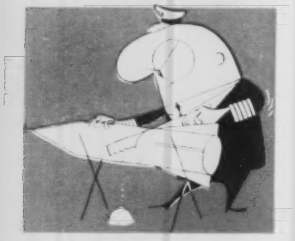
A. M. BYERS CO., Pittsburgh, terms its new 4-D wrought iron the most significant development in the history of wrought iron metallurgy.

The company says that 17 years of laboratory and service tests have proved that 4-D has superior resistance to many kinds of corrosion.

E. P. Best, Byers' chief metallurgist, says it has greater uniformity and improved physical and mechanical properties, compared with standard wrought iron. To make the product, Byers substantially increased the deoxidation of the base metal, increased the phosphorus content, and used a more siliceous silicate fibrous material.

Byers will market the material immediately at the same price as the standard product.

This wrought iron sponge ball is being discharged onto a forging press bed



Navy Warns of Missile Program Cuts

WHEN military men change jobs, they seem prone to offer industry helpful advice. Last year, Maj. Gen. D. H. Baker, former head of the Air Force's Air Materiel Command, warned aircraft people of pending cutbacks (STEEL, May 20, 1957, p. 101), then joined Capital Airlines. This year, a similar role is being played by Rear Adm. F. S. Withington, chief, Navy Bureau of Ordnance. He is not leaving the service. He's just moving out of the Bureau of Ordnance, so maybe his words are a little cautious.

Estimating trends in Navy weapons, he says: 1. "The trend toward weapon system development will continue." 2. "There will be fewer varieties of guided missiles."

The admiral's train of thought runs this way: "World conditions and strains on the national budget are such that we cannot permit dissipation of our resources to the extent that current trends indicate." We must reduce "the number of actual hardware developments and missile growth programs."

And the Need for Cost Cutting

Like General Baker, Admiral Withington also has advice to offer industry about the high cost of modern ordnance. The trend runs like this, he says: "Higher performance equals greater complexity, plus greater cost, plus more acute maintenance problems." Warning that the Navy cannot accept that trend as axiomatic, he says it must be attacked by: 1. Greater "ingenuity" in engineering. 2. More "realistic" specifications. 3. Increased use of standard items.

Rather than announcing a radical shift, Admiral Withington has provided industry with some needed clarification. The point is: Costs of our defense effort will be analyzed as closely this year as last, despite the Russian satellite and missile gains. Defense business in the postsputnik era will not be anyone's gravy train.

Bill Would Hamstring Industry?

George Hannaum, director of industry planning service, Aircraft Industries Association, reports another kind of threat to defense business. A Hoover Commission bill passed by the Senate last year and now before the House provides for appropriating funds on an "annual accrued expenditure basis," forcing contractors to shut down if they use up all their funds before the end of the year.

Mr. Hannaum believes this would "hamstring" industry's chances of acting on important scientific breakthroughs which might come after the funding of a program. Asking for supplemental appropriations is too time consuming, he says. The bill would also stop the carryover of funds from one year to the next.

Highways for Recession Tonic

The present federal interstate system of highways will take 24 years to complete as scheduled by the rate of federal apportionment of funds, says Sen. Albert Gore (D., Tenn.). There are many reasons why the program needs speeding up, thinks the senator, but the best is the current recession: Look for a rapidly developing move in Congress to appropriate general revenue money for the highway program.

The administration's post office program is generally discounted as not enough, and some observers wonder if a Congressional move to speed up highways won't come too late to help. (It takes almost two years to translate appropriations into poured concrete.) In January, another 25 miles (73 contract miles) of the interstate system were completed; contracts were awarded for about 100 miles (302 contract miles), costing over $174 million. All contracts for grading, steelwork, road laying, and landscaping are included in the contract mile. So 3 contract miles are about equal to 1 actual mile of highway.

Housing Will Help, Too

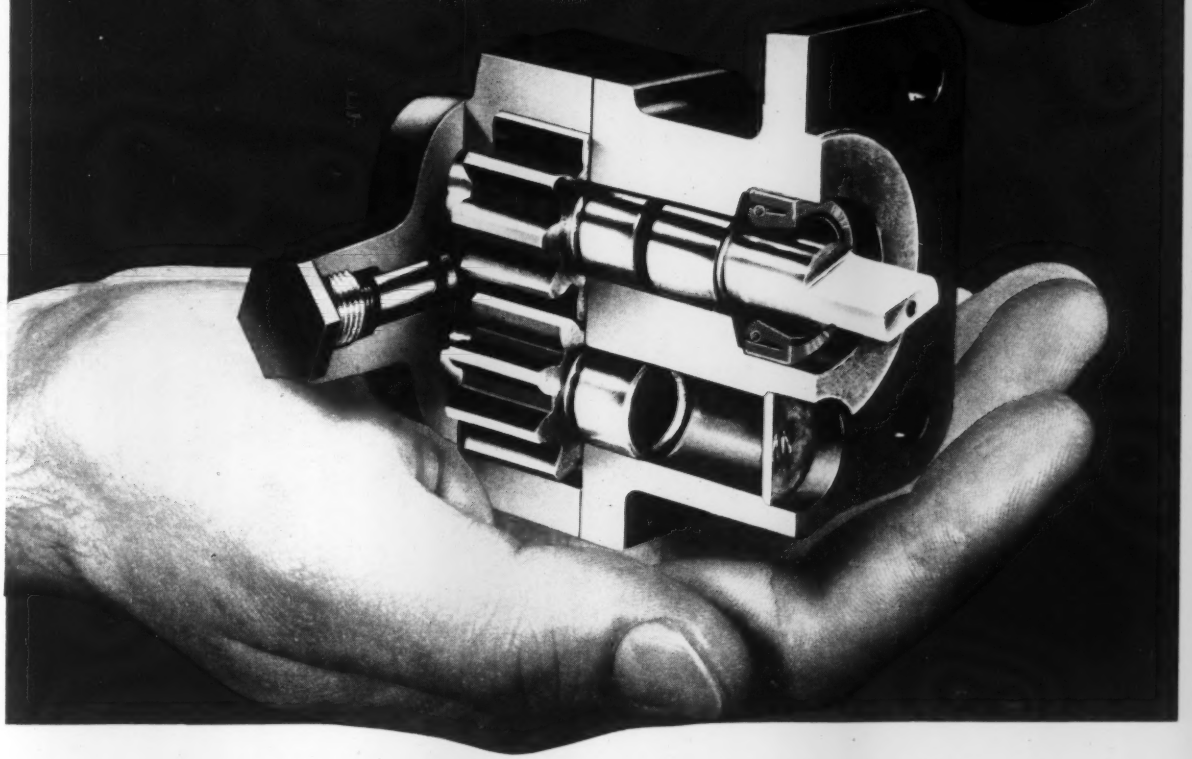
"Bold and forthright action" is needed to enable the housing industry to help pull the nation out of its slump, comments Nels G. Severin, president, National Association of Home Builders. He recommends revival of GI housing and a reduction in down payments required on mortgages by the Federal Housing Administration.

Private housing starts in January reached 64,200, a seasonally adjusted annual rate of 1.03 million—highest since August. Starts in 1957 totaled 962,000, compared with 1.2 million in 1956.

Capitol Notes

National Steel & Shipbuilding Corp., San Diego, Calif., and Todd Shipyards, San Pedro, Calif., received about $45 million worth of business last week under the Maritime Administration's policy of spreading ship contracts around the country . . . The aircraft-missile industry will invest $1 billion in research and test facilities in the next five years . . . To stay on schedule the St. Lawrence Seaway needs $35 million in fiscal 1959, instead of the $18 million it got, says Sen. Charles Potter (R., Mich.)

Champion performance in a fist-sized pump...sealed by C/R



THE PROBLEM:

To seal a rotary pump handling a wide range of fluid viscosities, pressures and temperatures

These pumps are performing dependably in hundreds of different hydraulic applications. They handle any fluid with lubricating qualities . . . deliver up to 180 gph, and maintain high volumetric efficiency even with low viscosity fluids. This particular pump also carries Underwriters' Laboratories approval for use in oil burners. For dependable sealing, C/R's Type HMS Oil Seal was chosen. It performs effectively from 28″ Hg to 5 psi, and from 50 to 8000 rpm. This is only one of the thousands of ways in which C/R Oil Seals and engineering are solving difficult sealing problems throughout industry. C/R engineers can help you, too—especially where critical conditions exist. A letter or telephone call will get them started for you. Write for your copy of the catalog, "C/R OIL SEALS."

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C/R OIL SEAL DIVISION
CHICAGO RAWHIDE

AMERICAN ORIGINALS IN IRON AND STEEL

The forge in the chimney corner

As our nation continued to expand after the Revolutionary War, one of its most pressing needs was for greater production of simple, flat, iron nails. The nails of that time generally were crude fastenings, hammered by hand from strips of metal. The process was inefficient and time consuming. But, the need was so great that even children in the home were pressed into service as nail makers.

In 1789, a Member of Congress stated: "It has become common for our country people to erect small forges in chimney corners. Great quantities of nails are made . . . even by children." But a year later, in 1790, the situation was suddenly changed by a Jacob Perkins of Newburyport, Massachusetts. Perkins, a mechanical genius of his time, invented a nail-making machine capable of producing 200,000 nails per day, and thus brought an end to the task of household nail making.

* * * *

Many men, machines, methods and materials have contributed to the development of our iron and steel industry. We at The J. E. Baker Company are proud of the fact that, since 1889, steel makers have relied on Baker's Magdolite and Jebcolite, the original dead-burned dolomites for more uniform ingots, greater furnace efficiency, and lower refractory costs. Magdolite and Jebcolite offer many advantages . . . in superior composition, preparation, strength, economy and quality.

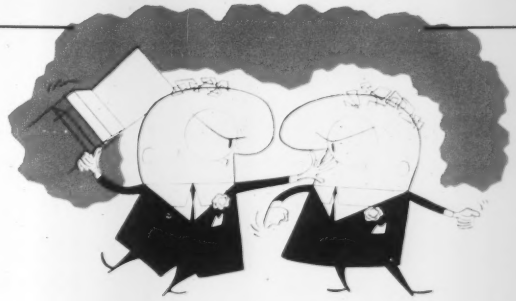
ANOTHER AMERICAN ORIGINAL

JEBCO
PRODUCTS
SINCE 1889

BAKER'S MAGDOLITE
The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO



Proxy Fights . . . Their 'Ins' and 'Outs'

You are vulnerable—
To a raider-type fight when:

1. Your stock is underpriced.
2. You are operating at a deficit and a good prospect for a tax loss carryover.

To a nonraider type fight when:

1. Earnings are poor.
2. Dividends are inadequate.
3. Executive salaries, bonuses, expense accounts, etc., appear excessive.
4. Stockholders feel their interests aren't being protected because of excessive management membership on the board.

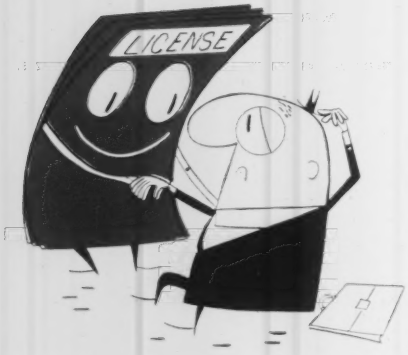
Buildup in stock activity means trouble if there is:

1. An increase in volume of trading.
2. An advance in prices that's out of line with sales and earnings, stock price gains in your industry generally, and the Dow-Jones averages.
3. An increase in amount of stock being held in "street" accounts, which hide the identity of the purchaser.
4. A time lag between sales and transfers—you can't determine the buyer until certificates are presented for transfer.
5. A sudden spurt in requests for your stockholders' list.

To battle once the fight's on:

1. Analyze stockholder list to determine friend and foe.
2. Get background of the known opposition. Be sure you can prove all charges you'll make.
3. Make arrangements to buy additional shares you'll need.
4. Anticipate charges you'll face. If possible, do some of the things the opposition will say you should have done—perhaps you'll even want to declare an extra dividend.
5. Get a good public relations firm that will get your story out fast.
6. Employ professional proxy solicitors—training your own employees may lose valuable time.
7. Set up internal organization to collect, evaluate, disseminate information rapidly. In planning fight strategy, you should not be bogged down with details.
8. Keep running progress report on the fight to analyze strengths and weaknesses—yours and the opposition's.
9. Prepare with care for the stockholders' meeting although it will probably be something of an anticlimax. Skirmishes will take place, but most of the problems at this point will be legal.

Source: Adapted from a speech by Brainerd Chapman of Lord, Bissell & Brooks, Chicago, given at Midwest Stock Exchange Stockholders Relations Clinic.



Licensing Can Help You . . .

1. Diversify your product line.
2. Enter new fields.
3. Improve your products and processes.
4. Take on products which compete with your own.
5. Derive income from patents you're not using.

Licensing: A Road to Profit

TAKE A LOOK at licensing as one way to bolster sagging business.

Our rapid technological progress has spurred the practice. Research and development expenditures by the government are making many products available under royalty-free licenses. Nonprofit research organizations use the device to gain income for more research and improve their service to industry.

Where They Come From—Many licensing arrangements get their start when an inventor finds a manufacturer to produce or use his patented process or product. The inventor is compensated by royalties.

That's still a prevalent practice. But alert managers aren't waiting for inventors to come to them. They're learning that licensing can open up new opportunities if a systematic approach is used (see checklist above).

You must take the initiative. Most of the research organizations have lists of firms they contact when they have a product or process available. If you've never been contacted, let them know you're interested and in what fields.

What You Can Do—Only two things limit what you can do with licensing, say the experts: The project must be legitimate, and it must not violate antitrust laws.

National Acme Co., Cleveland, spotted a small thread rolling tool at a trade show in Germany in 1952. "We liked it, and it had no counterpart in this country," says Robert R. Rhodehamel, vice president. "So we started negotiations with the German firm for a license. After it obtained a German patent, we helped it get a U. S. patent. We have an exclusive license in America and have made several improvements which we've passed back to the Germans. It has been a satisfactory and profitable undertaking."

Fawick Corp., Cleveland, went to a German firm for a license to produce electric clutches and brakes. Says John Eakin, vice president: "It was easier and cheaper to get a license than to develop our own."

Elgin National Watch Co., Elgin, Ill., developed a special alloy for watch springs. It patented the material and the process. Then it licensed three firms to produce the alloy. Elgin reserved for itself the use of the alloy in the watch field, but the licensees can sell it for other applications, giving the watchmaker a royalty in return.

Another Approach—A few firms establish a patent development department in connection with their research and development facilities. With this approach, companies like Illinois Tool Works, Chicago, look to licensing for added income.

An allied approach: Some firms earn additional income by getting foreign patents on their products and licensing foreign firms. A Cleveland maker of wire products is now cultivating foreign manufacturers. It expects its income from such licenses to about equal its income on domestic sales.

Armour's Method—Nonprofit research organizations such as Armour Research Foundation, Chicago, offer licensing arrangements. Suppose a scientist at ARF comes up with a promising idea for a new product or process but available funds will support only part of the necessary development work. ARF will approach companies with this proposition: If you supply the necessary funds to carry the project to completion, we will grant you a license to produce the item.

"Because of the nonprofit status of our activities," says E. W. Wickert, manager of licensing operations, "our licensing agreements will often differ from those granted by private firms. We rarely grant an exclusive license. But in the example above, we would certainly grant protection to the firm for the money it risked.

A possible clause might include a five-year exclusive license to give the firm a chance to recover its capital and give it a head start on the market."

Grant Approach—Research Corp., New York, is unique. A nonprofit organization, it distributes its total net income as grants-in-aid for research to colleges, universities, and scientific institutions — it has arrangements with about 100 organizations.

The participating institution can apply for a grant when it has an idea for a new product or process. A staff of experts at Research Corp. evaluates its potential. If approval is given, a grant for development work is made in return for the institution's promise to assign the patent to Research Corp. If and when a patent is obtained and Research Corp. can interest a licensee, royalties are shared by Research Corp., the institution, and the inventor.

Research Corp. officials say they get about 300 invention disclosures yearly. They accept about 1 in 20. Only one in ten of the survivors earns income. Only a handful ever yield substantial royalties.

Elgin-Kidde Method — Perhaps you have an idea for a product you'd like to use but do not have the talent or facilities to develop and manufacture it. It's possible to interest someone else to share in the development under a licensing arrangement. Elgin National Watch has an arrangement with Walter Kidde Nuclear Laboratories Inc. on the development of an atomic battery.

Elgin is furnishing the funds and Kidde is doing the research — a prototype has already been announced. When the product is developed far enough for commercial use, Elgin will have an exclusive, royalty-free license to use the battery in the watch field. Walter Kidde, the patent owner, will license it elsewhere. Both Elgin and Kidde will share the royalties.

Three Types—These are the common kinds of licenses:

1. Exclusive: The patent holder grants you exclusive rights to make, use, and/or sell the product or process.

2. Nonexclusive: The patent owner grants a license to more than one firm.

3. Limited-exclusive: You get exclusive use of the license for a limited activity. The license may be limited to a specific product, geographical territory, market, or industry. Or the license may be limited to its term of life.

Payment—Royalties run the gamut. They can be based on a specific amount for a given volume of production or sales. They are frequently based on a percentage of the selling price. They can carry minimum guarantees. They can be one-shot arrangements under which you pay a fixed amount for the license.

You'll find most royalties range from 3 per cent of selling price on high volume items to 10 per cent or more on low volume, high priced products.

Legal Angles—One word of caution: A license is a legal document, and it takes a patent expert to insure maximum protection and benefits. Such topics as these are important: Patent searches to guard against infringement suits, breach of contract and termination clauses, sublicensing, royalties, limitations, and appointment of an arbitrator in case of licensor-licensee disagreement.

But those are details for the legal experts and should not deter you. Licensing offers a variety of opportunities—for licensors and licensees.

** An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

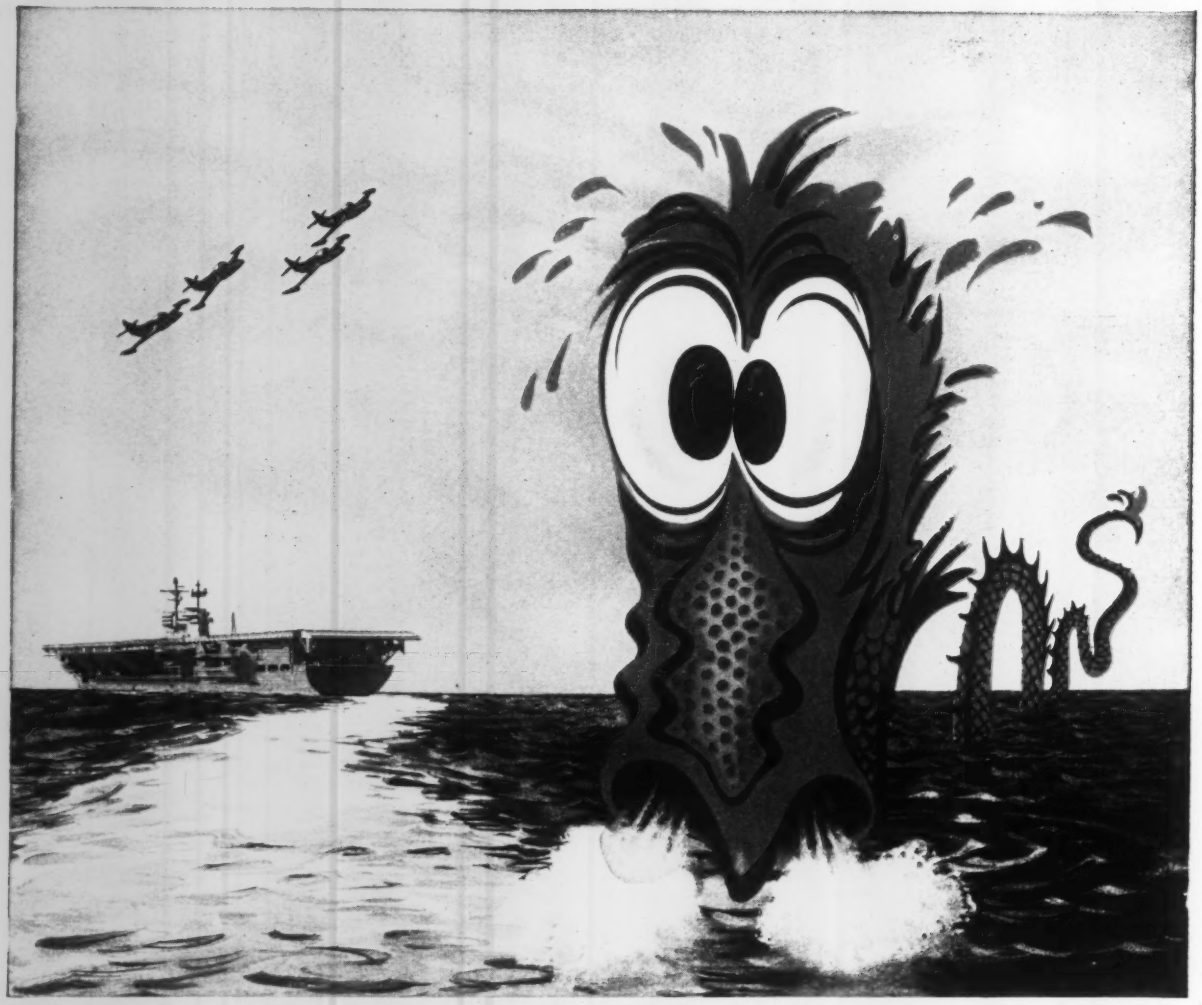
If you're searching for licenses, check . . .

1. U. S. Superintendent of Documents—he has booklet listing over 9000 patented items which are available under royalty-free license.
2. *Official Gazette*—weekly publication of the U. S. Patent Office.
3. Patent owners—when you know what product you want, a patent search can usually turn up their holders.
4. Patent attorneys or industrial associations—they can narrow your search and supply leads.
5. Research organizations—outfits like Armour Research Foundation deal in patent matters daily.
6. Foreign and domestic trade shows—foreign exhibitions can be particularly helpful.

If you're writing a license agreement, these are key clauses . . .

1. The life or term of the license.
2. Royalty and payment—method and place of payment, period of reporting, and payment.
3. The "diligence" statement—you promise to expend your best efforts to make, use, or sell the product or process.
4. Patent identification—you promise to mark the patent number on the item or package.
5. Inspecting the books—you give the licensor or a public accounting firm permission to inspect your books.
6. The "improvement" statement—you agree that any improvements made by licensor or licensee will be available to the other party.

PERMOBOND COVERINGS



The Case of the Frustrated Sea Monster

Put steel propeller shafts in contact with bronze bearings. Then add salt water and you create a *monster*.

The three have combined to produce an electrolytic action which pits the steel shaft, weakening it and inviting breakage under the severe stresses involved in the radical maneuvering of fighting ships.

In such great new super-carriers as the "Forrestal" and "Saratoga" (as in their predecessor of decades ago, the first "Lexington") this "monster" of electrolysis can't exist. Propeller shafts are covered with U. S. Permobond®, the rubber lining that defies electrolytic attack and corrosion.

Permobond Covering and Linings can be applied to any metal section, large or small, simple or complex. When unit is too large to ship, our field crew will install and vulcanize Permobond right in your own plant, or install Permobond as original equipment in the fabricator's plant. Where special conditions occur, a wide range of synthetic Permobond lining stocks is available.

If there's a monster on sea or land, corroding your operations, get in touch with any of the 28 "U. S." District Sales Offices or write us at Rockefeller Center, New York 20, N. Y.

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Mechanical Goods Division

United States Rubber

SEE THINGS YOU NEVER SAW BEFORE. VISIT U. S. RUBBER'S NEW EXHIBIT HALL, ROCKEFELLER CENTER, N. Y.

Simca Aronde (France)

Price, New York: $1575		Engine: 4 cylinder, OHV
Length:	162 in.	Horsepower: 52/4500 rpm
Wheelbase:	96.2 in.	Displacement: 78.8 cu in.
Height:	59 in.	Comp. Ratio: 6.75:1
Weight:	2009 lb	Capacity: 4 passengers

Triumph (England)

Price, New York: $1699		Engine: 4 cylinder, OHV
Length:	145 in.	Horsepower: 40/5000 rpm
Wheelbase:	88 in.	Displacement: 57.8 cu in.
Height:	60 in.	Comp. Ratio: 8.5:1
Weight:	1617 lb	Capacity: 4 passengers

Fiat 600 (Italy)

Price, New York: $1298		Engine: 4 cylinder, OHV
Length:	130.5 in.	Horsepower: 22/4600 rpm
Wheelbase:	78.7 in.	Displacement: 38.8 cu in.
Height:	55.3 in.	Comp. Ratio: 7:1
Weight:	1230 lb	Capacity: 4 passengers

Why Car Imports Mount

AT LEAST 32 foreign economy cars are competing for a slice of this year's 300,000-unit import market.

Volkswagen is shooting for 100,000. Ford hopes to sell 40,000 of its seven English-built autos, and General Motors is aiming at 20,000 units with its Vauxhall Victor and Opel Rekord.

Black Market—The demand for Volkswagens is still so heavy that nonfranchised dealers are buying used ones in Europe and offering them for immediate delivery here at prices ranging from $1700 to $2200. The list price for a standard VW is still $1545 (port of entry, New York City), but there's a six to eight month wait for delivery.

U. S. Competition — American Motors is throwing the Rambler American into the economy car fray. Studebaker-Packard Corp. is pushing its low priced Scotsman, and the Big Three stand ready to pick up anything they can with Fords, Chevrolets, and Plymouths.

Autodom figures that by 1962 economy imports will easily account for 500,000 sales annually. The latest arrival, scheduled for spring introduction, is built by Van Doorne Automobile Works, Eindhoven, Holland. It's powered by a 2 cyl-

U. S. Auto Output

Passenger Only

	1958	1957
January	489,357	642,089
February		571,098
March		578,826
April		549,239
May		531,365
June		500,271
July		495,629
August		524,354
September		284,265
October		327,362
November		578,601
December		534,714
Total		6,107,813

Week Ended	1958	1957
Jan. 18	109,761	145,761
Jan. 25	107,495	145,191
Feb. 1	104,359	140,411
Feb. 8	109,028	147,163
Feb. 15	101,229†	145,846
Feb. 21	98,000*	138,938

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

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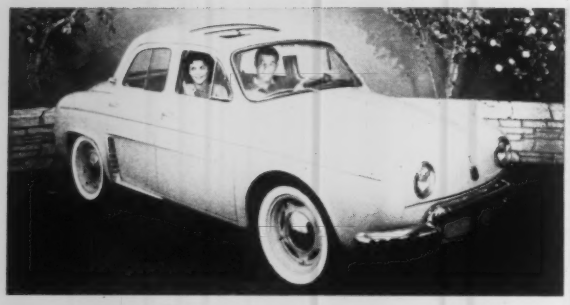


Renault Dauphine (France)

Price, New York:	$1645	Engine:	4 cylinder in rear
Length:	156.6 in.	Horsepower:	30/4250 rpm
Wheelbase:	89.5 in.	Displacement:	51.5 cu in.
Height:	56.8 in.	Comp. Ratio:	7.25:1
Weight:	1340 lb	Capacity:	4-5 passengers

Volvo (Sweden)

Price, New York:	$2238	Engine:	4 cylinder, OHV
Length:	174 in.	Horsepower:	85/5500 rpm
Wheelbase:	102.3 in.	Displacement:	96.4 cu in.
Height:	66 in.	Comp. Ratio:	8.2:1
Weight:	2140 lb	Capacity:	4 passengers

SAAB 93 (Sweden)

Price, New York:	$1895	Engine:	3 cylinder
Length:	157.1 in.	Horsepower:	38/5000 rpm
Wheelbase:	98.4 in.	Displacement:	45.6 cu in.
Height:	60 in.	Comp. Ratio:	7.3:1
Weight:	1734 lb	Capacity:	4 passengers

Morris Minor 1000 (England)

Price, New York:	$1705	Engine:	4 cylinder, OHV
Length:	148 in.	Horsepower:	37/4800 rpm
Wheelbase:	86 in.	Displacement:	57.8 cu in.
Height:	60 in.	Comp. Ratio:	8.3:1
Weight:	1706 lb	Capacity:	4 passengers

inder, 22 hp, air cooled engine and seats four. The car reportedly averages 40 mpg. Price is $1050, including heater.

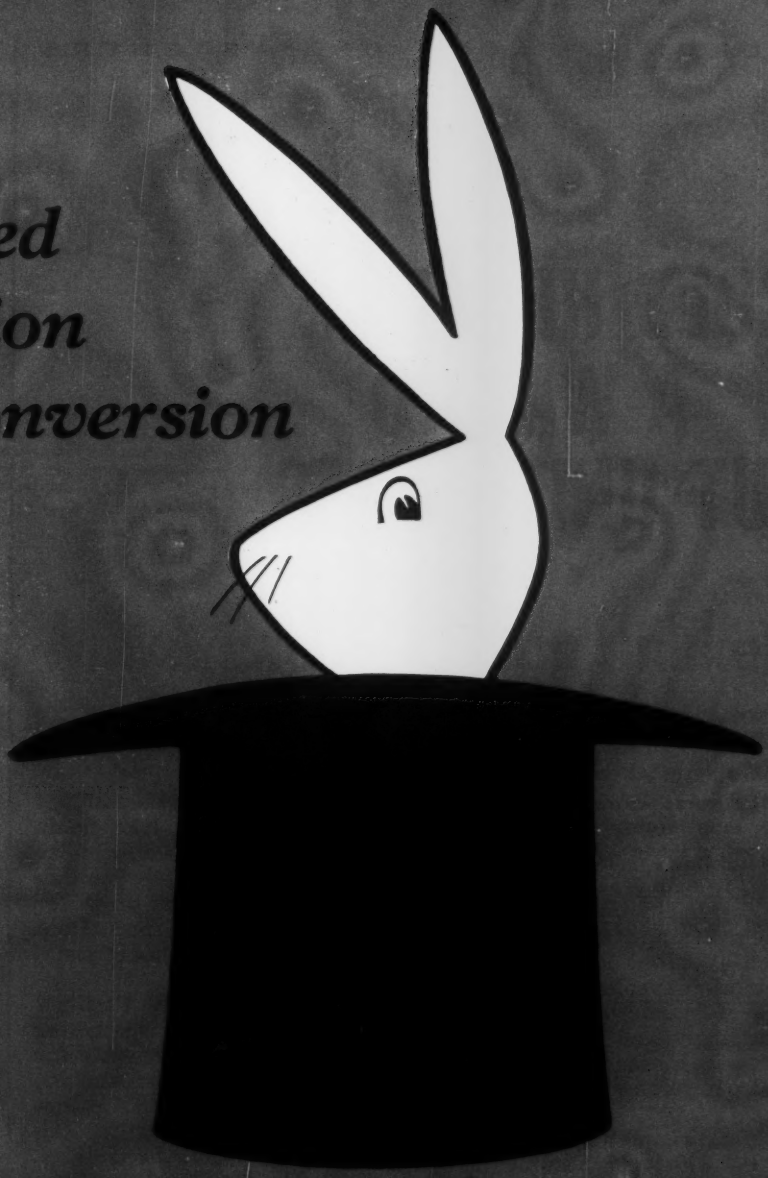
The Van Doorne is on the low end of the price scale. Sweden's $2238 Volvo is close to the top. In between come a host of cars from England, France, Germany, and Italy. Some of the lesser known, but still popular brands, are shown on these pages. Sports cars like the Jaguar are a different breed of cat.

Cheap To Run—While low-cost operation is the biggest reason for buying this type import, the desire to be different is also a factor. Evidence: You can get a Studebaker Scotsman for $1795; an English Morris Minor sells for $1705; Sweden's SAAB costs $1895.

Foreign car prices quoted here include ocean freight, excise taxes, and import duties but exclude interstate transportation fees, state and local taxes, and optional equipment. U. S. car prices exclude local taxes, optional equipment, and transportation charges.

Fair Sized Package—One charge that keeps cropping up is that the "small" import puts the squeeze on seating space. It isn't quite true. Front and rear seat headroom of Fords, Chevrolets, and Plymouths averages 34 in., vs. 36 in. for the average import. But these American cars have wider seats, an average of 5 ft, vs. 4 ft.

Segmented automation makes conversion practical



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COLD HEADING: A WAY TO CUT UNIT COSTS

- **Eliminates extra operations; faster than forging**
- **Metal flows to shape — without waste, without machining costs**

Here's a manufacturing fact often overlooked: The same machines that spill out large volumes of standard fasteners at surprisingly low cost can also produce *special* mechanical parts . . . also in volume and also at low cost.

It's surprising what an *expert* can do with cold heading machines. Some parts that would otherwise be two or more pieces are turned out as uniform, integral units. Parts that would otherwise require slower, costlier machining spout from the cold header with little or no scrap loss. What's more, the pieces are stronger.

Case Histories: (1) Eliminating double forging operation, high speed cold heading machine cuts and bends lengths from continuous rod to form shifter lever. It also gives greater strength, improved finish, closer tolerances. (2) Instead of a machined screw assembled with separate stamped screw driver shield, hose clamp screw is now cold headed in one piece. (3) No longer cut on screw machine, insert screw for plastics costs 40% less. Cold header uses just amount of metal required.

Call on the RB&W Fastener Man. He can tell you whether or not cold heading is feasible for producing your screw machine parts, forgings and small assemblies. If so, RB&W facilities can handle your volume needs. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

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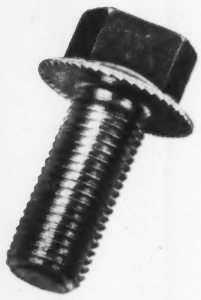
Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Fargo. **Distributors from coast to coast.**



Spin-Lock Screws Eliminate Washers

Ratchet action teeth on Spin-Lock Screws bite into the seat of any surface the screw is driven into. Their tight hold requires about 20 per cent more torque to loosen than to tighten. With this strong grip, separate washers or other locking devices are unnecessary. One-piece Spin-Lock construction gives faster assembly, lowers inventory needs—and affords fasteners that will stay tight in products subjected to vibration or repeated heating and cooling. Send for bulletin.

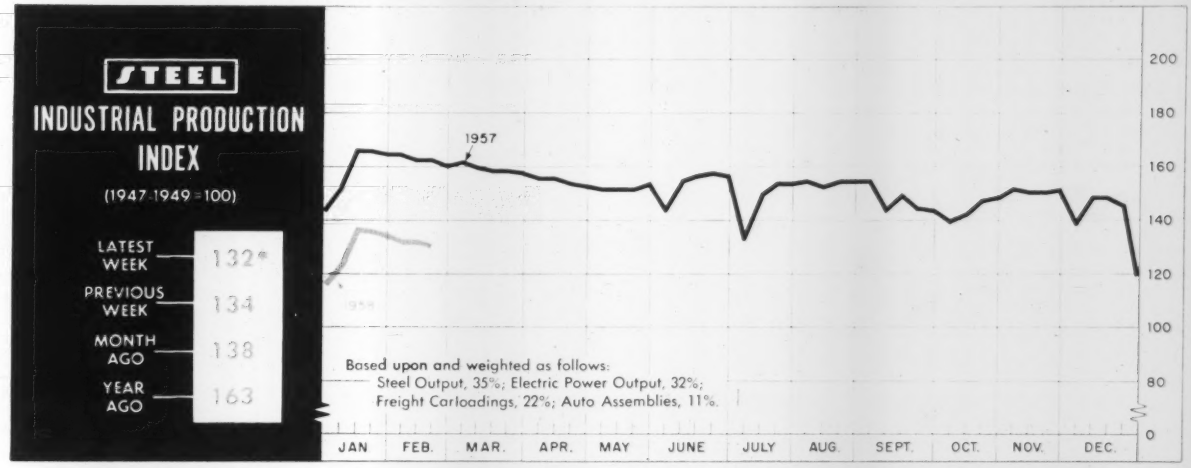
12-point fasteners cut wrench clearance space

Double hex RB&W bolts and nuts measure smaller across their points than single hex fasteners. Used with an external socket wrench, they permit optimum driving torque to be applied.

Thus, while fitting cramped spaces in compact assemblies, these fasteners also assure proper preloading for *stronger* connections.

Available with plain flange, or SPIN-LOCK design.

RB&W FASTENERS—STRONG POINT OF ANY ASSEMBLY



*Week ended Feb. 15.

Auto Cutbacks Make Early Upturn Unlikely

LACK OF DEMAND in the auto industry is going to keep STEEL's industrial production index depressed for at least a couple of months. Heavy spring selling could go a long way toward halting that trend in the second quarter, but many observers feel this is wishful thinking.

So far, the similarity of the 1957 and 1958 first quarter trend lines is clear (see chart above). Since the first full week of this year, the index has tapered off an estimated 7 percentage points, compared with a 6 point drop in the corresponding 1957 period. The important difference is that this year's line is riding about 30 points below its predecessor. The auto industry alone cannot be blamed for the difference, but it has caused a large part of it.

Autos' Role—During the week ended Feb. 22, auto and truck production dropped below 100,000 units. Five weeks earlier, the count was almost 140,000. More cutbacks are on the way. Stocks are already near the 900,000 mark, a record which many Detroit observers had not looked for until around June 1. Cold weather, unemployment, and a bleak business outlook in February combined to cut the early-month selling rate to about 13,000 units daily, says *Ward's Automotive Reports*.

For many months, the steel industry has claimed that lower-than-expected buying of auto firms is one big reason it has not operated at greater capacity. Reduced auto consumption now will tend to cut the operating rate of steel mills still more. The operating rate for the last four weeks has been close to 54 per cent of capacity. Many steel officials have predicted this would be the lowest month of the recession for their companies.

Fewer Carloadings—For the railroads, the developments in Detroit spell more bad news. Carloadings have been in a continuous downdrift since the early close of the lake

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,459[1]	1,445	2,504
Electric Power Distributed (million kw-hr)	12,000[1]	12,289	11,946
Bituminous Coal Output (1000 tons)	7,465[1]	8,120	9,725
Crude Oil Production (daily avg—1000 bbl)	6,850[1]	6,858	7,515
Construction Volume (*ENR*—millions)	$208.7	$322.9	$311.6
Auto, Truck Output, U. S., Canada (*Ward's*)	128,345[1]	135,283	179,835
TRADE			
Freight Carloadings (1000 cars)	540[1]	532	676
Business Failures (Dun & Bradstreet)	342	326	287
Currency in Circulation (millions)[3]	$30,675	$30,579	$30,641
Dept. Store Sales (changes from year ago)[3]	−8%	−2%	+4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$18,670	$22,610	$18,546
Federal Gross Debt (billions)	$274.5	$274.4	$275.9
Bond Volume, NYSE (millions)	$21,999	$24,169	$23,653
Stocks Sales, NYSE (thousands of shares)	10,003	12,371	11,942
Loans and Investments (billions)[4]	$87.1	$86.2	$85.1
U. S. Govt. Obligations Held (billions)[4]	$26.3	$25.9	$25.9
PRICES			
STEEL's Finished Steel Price Index[5]	239.15	239.15	225.92
STEEL's Nonferrous Metal Price Index[6]	201.0	201.0	240.6
All Commodities[7]	118.8	118.6	117.0
Commodities Other than Farm & Foods[7]	125.8	125.8	125.4

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1958, 2,699,173; 1957, 2,559,490. [3]Federal Reserve Board. [4]Member banks Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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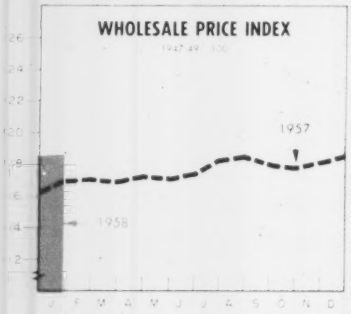
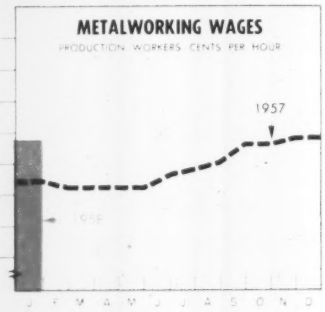
THE BUSINESS TREND





	All Commodities 1958	All Commodities 1957	Other Than Farm & Foods 1958	Other Than Farm & Foods 1957
Jan.	118.7	116.9	126.0	125.2
Feb.	....	117.0	....	125.5
Mar.	....	116.9	....	125.4
Apr.	....	117.2	....	125.4
May	....	117.1	....	125.2
June	....	117.4	....	125.2
July	....	118.2	....	125.7
Aug.	....	118.4	....	126.0
Sept.	....	118.0	....	126.0
Oct.	....	117.8	....	125.7
Nov.	....	118.1	....	125.9
Dec.	....	118.5	....	126.1

U. S. Bureau of Labor Statistics.
Charts copyright, 1958, STEEL.

1957	Prim Mtls.	Fab. Prod.	Machinery	Elec. Mchy.	Trans. Equip.
Jan.	247	213	227	205	238
Feb.	245	213	227	206	238
Mar.	246	214	228	206	238
Apr.	246	214	228	206	238
May	246	215	228	205	237
June	248	217	230	207	240
July	252	218	230	205	241
Aug.	253	219	230	205	242
Sept.	256	222	232	207	246
Oct.	255	222	233	208	247
Nov.	255	223	234	210	250
Dec.*	255	221	234	211	248
1958					
Jan.	254	222	235	212	247

*Preliminary.
U. S. Bureau of Labor Statistics.

ore season. Cumulative loadings in 1958 are about 16 per cent under the year-ago figure. If auto production continues its decline, fewer parts and cars will be shipped by rail, aggravating an already serious problem for the roads. The week ended Feb. 8 represented the 26th consecutive week in which loadings failed to come up to the year-ago level.

The only bright spot in the production index picture is in the generation of electric energy. A sudden reversal of the recent downtrend saw output during the week ended Feb. 8 move up to 12.289 billion kw-hr to surpass the year-ago figure for the first time in four weeks.

Revival Possible—It is possible that February is setting the stage for a minor upturn in March—one that would bring that month back up to the January level. Auto dealers are still hoping for better sales. Cold weather may have caused postponement of some sales. A really good month for auto sales could do a lot to boost business morale across the board.

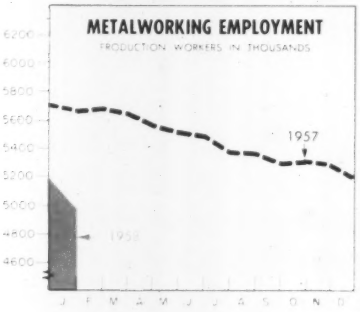
FRB Index Continues Dive

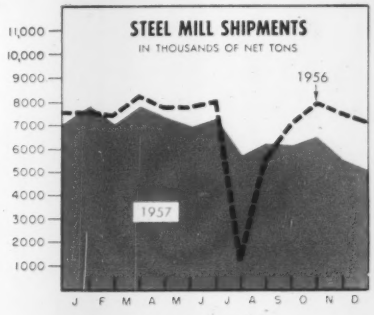
The January report on business by the Federal Reserve Board merely confirms what most everyone already knows—it was a pretty slow month. The FRB industrial production index dropped for the fifth straight month to a seasonally adjusted 133 (1947-49=100), 9 per cent beneath the corresponding month of 1957. The durable goods industries accounted for most of the decline. Primary metals slumped to an even 100 per cent of the base period, compared with 143 per cent a year-ago; while metal fabricating slipped to 160 per cent, vs. 180 in January, 1957.

Economists at Cleveland Trust Co., Cleveland, note the resemblance between this recession and those of 1948-49 and 1953-54. "Should the similarity of the pattern continue . . . manufacturing production would decline an additional 5 per cent to the 1958 low at about midyear," they conclude.

Inventories Still Dropping

The January report of the Purchasing Agents Association of Chicago—usually indicative of national conditions—points to a further reduction of inventories during the first half. This will continue to plague the steel industry and other suppliers of metal components. Al-





1957	Prim. Mtls.	Fab. Prod.	Mach- inery	Elec. Mchy.	Trans. Equip.
Jan.	1,133	904	1,287	884	1,481
Feb.	1,124	903	1,294	877	1,482
Mar.	1,112	898	1,291	869	1,474
Apr.	1,101	889	1,277	853	1,446
May	1,093	883	1,255	847	1,435
June	1,093	887	1,239	855	1,415
July	1,075	869	1,207	848	1,373
Aug.	1,077	878	1,180	861	1,363
Sept.	1,061	878	1,186	879	1,278
Oct.	1,049	889	1,166	869	1,321
Nov.	1,029	887	1,141	852	1,350
Dec.*	1,006	870	1,122	826	1,351
1958					
Jan.*	958	837	1,112	796	1,270

*Preliminary.
U. S. Bureau of Labor Statistics.

	Net Tons 1957	1956	1955
Jan.	7,809,451	7,587,870	6,009,958
Feb.	7,066,732	7,468,393	6,119,900
Mar.	7,821,616	8,255,824	7,268,795
Apr.	7,349,752	7,783,873	7,279,321
May	6,972,091	7,764,776	7,540,889
June	7,284,616	8,077,805	7,770,213
July	5,877,133	1,288,988	6,250,597
Aug.	6,229,853	5,539,915	7,053,615
Sept.	6,171,674	7,058,028	7,378,247
Oct.	6,550,690	7,930,957	7,216,821
Nov.	5,606,018	7,431,136	7,247,994
Dec.	5,092,913	7,064,093	7,580,943

American Iron & Steel Institute.

most two-thirds of the reporting agents say their inventories are lower now than they were a year ago, and half say they intend to lower them even more by July 1. Only 14 per cent intend to increase their inventories.

Confidence Is Not Gone

Businessmen are still confident of their ability to buck industry's downtrend, according to the quarterly survey by Dun & Bradstreet Inc. About three-fourths of the respondents expect their business in the second quarter to be the same as or better than it was in last year's corresponding period. Even among durable goods producers, 68 per cent are optimistic, although this is a decline from the 95 per cent so reporting a year ago.

There is no sign of an increase in employment during the second quarter. Eighty per cent of the respondents say they will hold the line or continue to cut back.

Prices Leveling Off

Wholesale prices continued to climb through January, but indications are they leveled off in February. The Bureau of Labor Statistics' index (see table, Page 54) for all commodities rose to 118.7 (1947-49=100) last month. That is the same as the average for the first two weeks in February (see Barometers of Business, Page 53). The index for all commodities other than farm and foods dipped in January to 126 per cent of the base period, and so far in February, the average is 125.8. The great majority (72 per cent) of the manufacturers surveyed in the Dun & Bradstreet report indicate they will hold the line on prices during the second quarter.

Equipment Orders Up

Many executives in the material handling industry are anticipating at least as much business this quarter as they had during last quarter, maybe more, reports the Material Handling Institute Inc. Beyond that, they expect business to pick up a bit. December orders came up to 105.65 per cent of the 1954 base period, vs. only 87.8 per cent in November.

The Foundry Equipment Manufacturers Association reports that its new order index for December gained slightly to 61.4 (1947-49=100) from the November low of 59.6.

Need a Deep Draw?

Somers

has an Ace in Unigrain®

To provide deep drawing thinstrip brass with increased tensile strength and elongation Somers installed the first high speed continuous annealer in the non-ferrous industry. This produces a much finer grain size than batch annealing with the result that only a single color buff is needed for a polished finish: heavy buffing and orange peel effect are eliminated, an additional saving in production time.
Whatever your problems in thinstrip brass, nickel, copper and alloys, Somers will be glad to solve them for you without cost or obligation.
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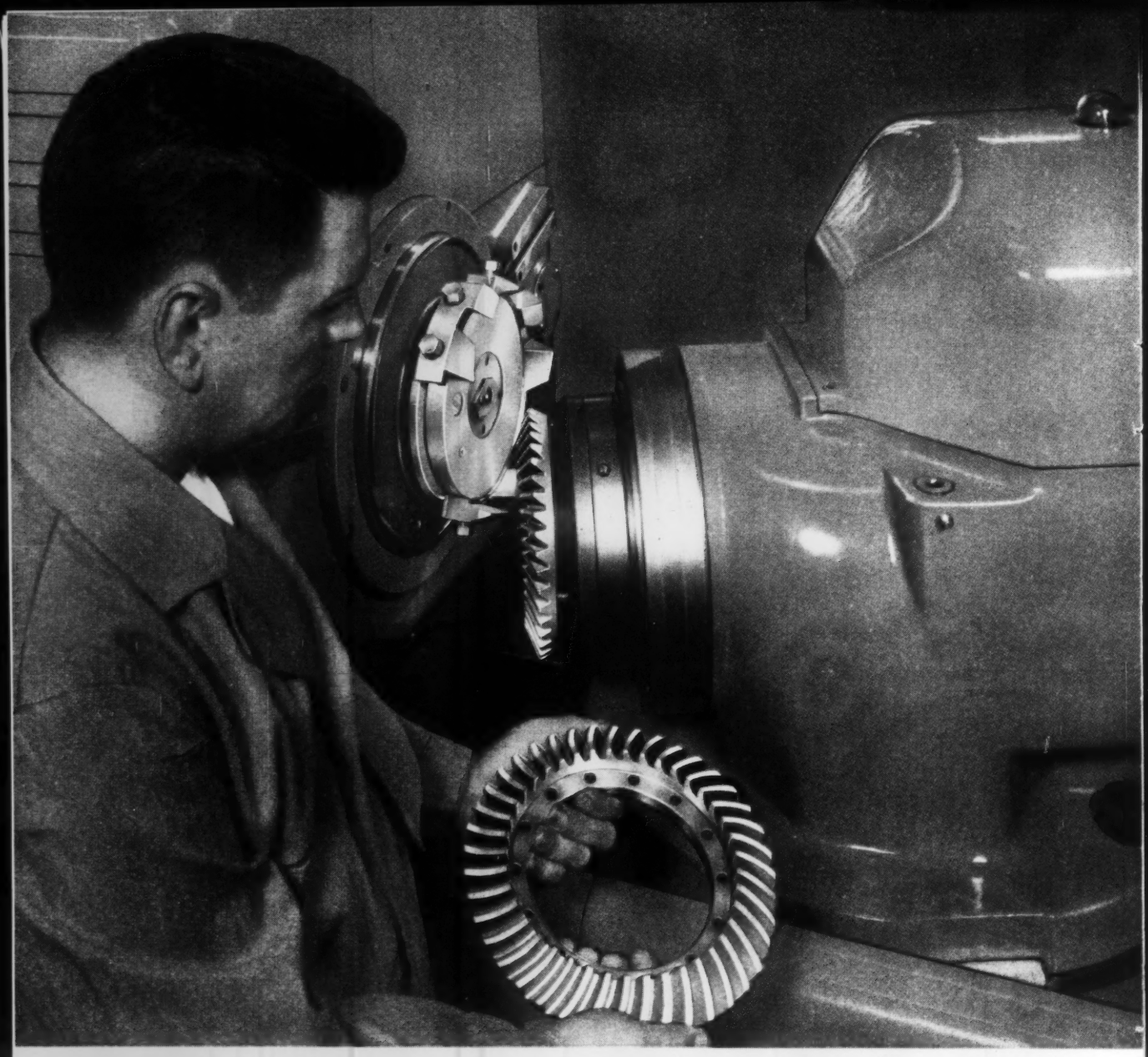

Helixform*—a new method for bevel gear production!

The new No. 112 Hypoid Helixform Gear Finisher assures improved quality and increased production on spiral bevel and hypoid non-generated ring gears up to 10½" in diameter, and 2½ DP such as employed in passenger car axles.

The Helixform Cutting Method used on this machine offers these advantages:

Conjugate tooth surfaces, minimized gear development, complete control of tooth bearing, and greater adjustability in final assembly.

We will be glad to send a bulletin giving further details on request. Ask for literature on the No. 112 Hypoid Helixform Gear Finisher and the companion No. 112 Hypoid Gear Rougher. Write for it today.

*Trade-Mark

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C3-A

BURTON SCHELLENBACH
Porter Company sales v. p.

J. HARTNESS BEARDSLEY
Bryant Chucking president

W. BURT CARTER
Penco Metal Products mgr.

M. A. CHAMBERS
heads Nat'l Machine Products

Burton Schellenbach was named vice president-sales for **H. K. Porter Company Inc.**, Pittsburgh. He was with the Cleveland office of Fuller & Smith & Ross Inc., advertising agency.

J. Hartness Beardsley was elected president, **Bryant Chucking Grinder Co.**, Springfield, Vt., recently merged as a subsidiary of Ex-Cell-O Corp. Formerly executive vice president, he succeeds **William J. Bryant**, now chairman.

Charles H. Williams was made administrative vice president-engineering; **James B. Austin**, administrative vice president-research and technology, **United States Steel Corp.**, Pittsburgh.

William W. Lauer was appointed director of purchases, **Read Standard Div.**, Capitol Products Corp., York, Pa. **C. W. Noss** continues as purchasing agent. Mr. Lauer was with the industrial division of Borg-Warner Corp. **William A. Mickey** was promoted to chief engineer, baking equipment, at Read Standard.

L. D. Morton succeeds the late **Ralph Allingham** as general superintendent, **Wilputte Coke Oven Div.**, Allied Chemical & Dye Corp., New York.

Rear Adm. Jackson S. Champlin, USN, ret., was appointed assistant to the director, **DataTape Div.**, Consolidated Electrodynamics Corp., Pasadena, Calif. He is succeeded as administrative manager of the division by **Russell R. Palmer.**

W. Burt Carter was appointed general manager of **Penco Metal Products Div.**, Alan Wood Steel Co., at Philadelphia. He was general superintendent of maintenance of all Alan Wood plants.

Philip E. W. Goodwin Jr. was named general manager of **Rockwell Mfg. Co.'s** new valve plant at Kearney, Nebr. He was general manager of the Sulphur Springs, Tex., valve plant. **William H. Shenkle**, chief engineer of Rockwell's instrument division at Tulsa, Okla., was promoted to general manager.

Lester E. Chaundy Jr. was elected vice president-manufacturing, **Allvac Metals Co.**, Monroe, N. C., which he joined in August as operations manager. He was previously president of National Precision Casting Co.

Frank G. Fisher, former vice president-general manager, Rheem Automotive Co., Fullerton, Calif., was appointed president and general manager, **Atkins Saw Div.**, Borg-Warner Corp., Indianapolis. He succeeds **S. J. Roush**, who is group vice president of Borg-Warner. Prior to joining Rheem Automotive, Mr. Fisher was vice president-general manager of Houdaille-Hershey Corp.

J. R. Brandon was made manager of the newly organized field service department, industrial products divisions, **Hewitt-Robins Inc.**, Stamford, Conn. **J. H. Hayden Jr.** was made product manager-conveyor equipment sales, Robins Conveyors Div., Passaic, N. J.

M. A. Chambers was elected president of **National Machine Products Co.**, Utica, Mich., acquired this year by Standard Pressed Steel Co. **John L. Cook**, former president, retired. Mr. Chambers was vice president-general manager and continues in the latter post.

Ernest R. Blomquist was made purchasing agent, **Benjamin Electric Mfg. Co.**, Des Plaines, Ill. He was purchasing director for Hupp Aviation Co.

John D. Reitz, formerly general manager, was elected president of **Symmco Inc.**, Sykesville, Pa.

Eastern Stainless Steel Corp., Baltimore, named **John W. Frederick** superintendent, polishing department; **Emil J. Thon Jr.**, head of the purchasing department. Mr. Frederick succeeds **Paul L. Richardson**, recently made mill representative for Eastern. Mr. Thon, former buyer, succeeds **C. C. Copenhaver**, retired last year.

Daniel Chieger, formerly in charge of sales engineering, was appointed director of engineering, automotive divisions, **Young Spring & Wire Corp.**, Detroit. He heads the company's product development, tooling, and plant engineering projects in the automotive field.

P. E. Church was elected president and general manager, **Canadian Automotive Trim Div.**, Ajax, Ont., for Young Spring & Wire Corp. of Canada Ltd. Before its acquisition by Young in December, the Ajax plant was operated by Canadian

DONALD J. TRICEBOCK
Diamond electronics mgr.

W. H. PERRY
Cardinal Scale president

FRED A. SCHUBERT
joins Cyril Bath

MICHAEL ZETZ
new post at J&L

Automotive Trim Ltd., subsidiary of National Automotive Fibres Inc., Detroit.

Donald J. Tricebock was made manager, electronics division, **Diamond Power Specialty Corp.**, Lancaster, Ohio. He was instrument division manager of Fischer & Porter Co.

W. H. Perry, general sales manager, Webb Corp., resigned that post to become president and assume the management of **Cardinal Scale Mfg. Co.**, Webb City, Mo., which he established a year ago.

Edward Lindberg Jr. was named assistant sales manager, **Diehl Mfg. Co.**, Somerville, N. J., division of Singer Mfg. Co. He was manager of fan sales.

Chester A. Tudbury was made chief engineer, **New Rochelle Tool Corp.**, New Rochelle, N. Y. He was research engineer, Tocco Div., Ohio Crankshaft Co.

Joseph P. Costigan resigned as general manager of American Machine & Foundry Co.'s Buffalo plant to join the executive production staff of **Crown Cork & Seal Co.** in Philadelphia.

At the Midland, Pa., Works of **Crucible Steel Co. of America, John E. Holt** was made assistant division superintendent-flat rolled products. He is succeeded by **Nelson G. Bell** as superintendent of the 24-in. bar mill.

Kenneth D. Sneed was made general manager of field engineering at **American Electronics Inc.**, Los Angeles. He was with Douglas Aircraft Corp.

Fred A. Schubert joined **Cyril Bath Co.**, Solon, Ohio, as superintendent of its contour forming division. Previously with Curtiss-Wright Corp. at Wood-Ridge, N. J., he was in charge of its sheet metal section in production engineering, supervising the processing of jet engines.

William E. Hood was made assistant manufacturing manager, unitary equipment division, **Carrier Corp.**, Syracuse, N. Y.

Herbert R. Spencer Jr. was elected president, **Erie Enameling Co.**, Erie, Pa. He continues as treasurer. **Herbert R. Spencer Sr.**, former president, is now chairman. **Robert E. Braggins**, executive vice president, was named secretary.

Hill-Chase Steel Co., Baltimore, appointed **Kingsbery W. Gay** district manager, Virginia.

Paul M. Allen and **D. Cameron Perry** were promoted to senior research engineers at **Armco Steel Corp.**, Middletown, Ohio.

William F. Ruzicka Jr. was made manager of purchasing for **Sylvania-Corning Nuclear Corp.**, Bayside, N. Y. He was purchasing agent for Argus Cameras Div., Sylvania Electric Products Inc. His office is at the firm's production facilities, Hicksville, N. Y.

Robert C. Gray was made assistant marketing manager, **Orr & Sembower Inc.**, Reading, Pa.

Eldon W. Hansen was made manager of planning and control at **Kaiser Steel Corp.'s** Montebello, Calif., fabricating division.

Michael Zetz was made superintendent, quality and production control, at **Jones & Laughlin Steel Corp.'s** new stainless sheet and strip mill, under construction at Louisville, Ohio. He has been associated with J&L's stainless steel division since January. Previously, he served in the metallurgical department at Crucible Steel Co. of America's Midland, Pa., Works, where he became division metallurgist in charge of melting and bar products.

Vincent T. Nolan was made purchasing agent, **Alloy Tube Div.**, Union, N. J., Carpenter Steel Co.

Frank H. Hurless was made sales manager, **Anaconda Sales Co.**, Anaconda Co., New York.

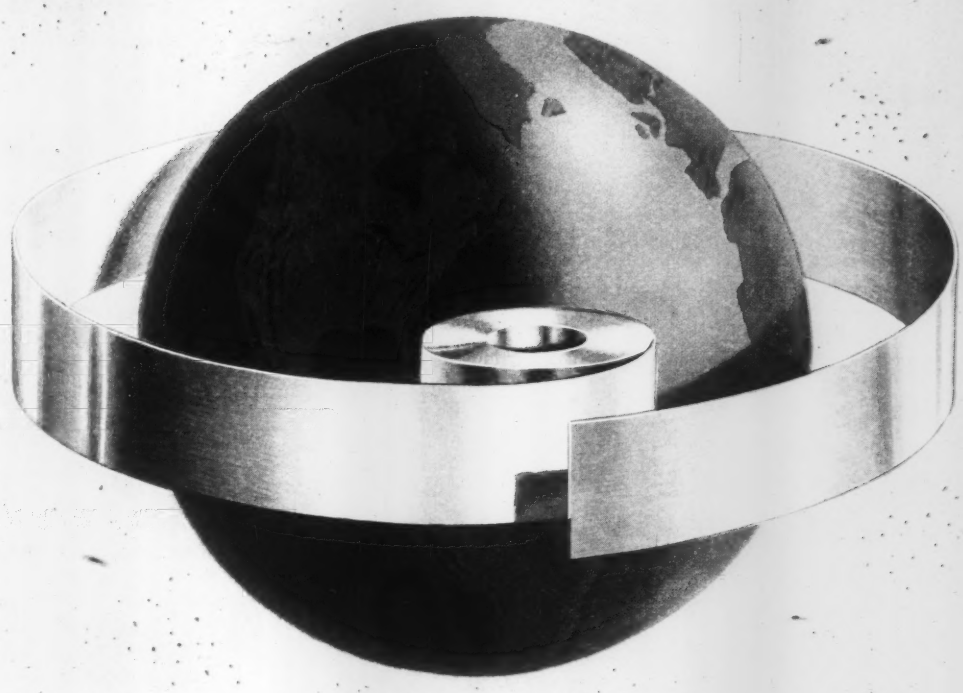
Rae E. Hasselbring was appointed general manager, warehouse division, **Reynolds Aluminum Supply Co.**, Atlanta.

Lamson Corp., Syracuse, N. Y., appointed **Calvin A. Burton** assistant to the vice president of systems.

John C. Millikin was made director of a new industrial engineering division established at **Twin Coach Co.'s** aircraft division plant in Buffalo. He was assistant director of production planning and tool design.

Roland Stevens acquired principal stock interest in **Burklyn Co.**, Los Angeles, and was elected president. **Ted Lynn**, who disposed of his interest in the company, has retired.

Wesley R. Kegerise was appointed metallurgist-high temperature alloys by **Carpenter Steel Co.**, Reading, Pa. He has headed the high temperature and special alloy depart-

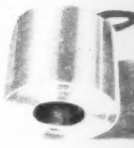


ALL AROUND THE WORLD . . . strip coil producers prefer Lee Wilson high convection annealing furnaces

Great Britain, Canada, Sweden, Australia, Japan, Germany, Brazil, Mexico, Chile, Belgium, Luxembourg, France, Spain—wherever steel is made—you'll find the number one annealing furnace to be Lee Wilson's efficient Single Stack High Convection unit.

The world over, steel engineers know that no other furnace can deliver the uniformity and quality, the speed and low operation cost of the versatile Single Stack.

When next you're considering annealing equipment isn't it just good business to talk first with the world's leading furnace builders—Lee Wilson's engineers?



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MAKE THE BEST METALS BETTER

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES

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ROBERT A. BARKER
Electric Auto-Lite post

ROBERT P. JENSEN
Kaiser Alum. div. sales mgr.

H. F. JACOBSMEYER
Grayson Controls sales mgr.

R. F. GAMUNDI
Eaton heater div. mgr.

KENNETH E. JOY
joins Judson L. Thomson Mfg.

ment in the company's research laboratory since 1952.

H. F. Jacobsmeyer was appointed sales manager, **Grayson Controls Div.**, Robertshaw-Fulton Controls Co., Long Beach, Calif. Former district sales manager for Grayson, he replaces **A. W. Beck**, recently named marketing vice president for the company.

R. F. Gamundi was promoted from assistant to the general manager to general manager, heater division, **Eaton Mfg. Co.**, Cleveland. He succeeds **William A. Mattie**, recently elected vice president-administrative of Eaton.

James Jarvie was named to the new post of general sales manager of **Ex-Cell-O Corp.'s** industrial sales organization. Working out of a new Ex-Cell-O office in Toronto, Ont., he is in charge of sales of the industrial products of both Ex-Cell-O of Canada, London, Ont., and Colonial Tool Co., subsidiary in Windsor, Ont.

Kenneth E. Joy was appointed general sales manager, **Judson L. Thomson Mfg. Co.**, Waltham, Mass. He was formerly vice president-sales of Bostitch Inc.

John A. Basher, vice president, Murray Corp. of America, was named to direct manufacturing for its **Easy Laundry Appliances Div.**, Chicago. He is responsible for product and tool engineering, purchasing, industrial relations, standards, and quality control for the division, and is responsible for factory operations of the Syracuse, N. Y., plant.

William H. Walter was appointed manager of a new market research department of **Huppower Div.**, Hupp Corp., Detroit.

George F. Bluth was named executive assistant to the vice president, Toledo, Ohio, division, **Continental Aviation & Engineering Corp.** He joined the division this year as a production engineer on special assignments. He formerly was general manager, diesel division, Utica-Bend Corp.

Louis D. Linta was appointed manager of quality control, forging division, **Transue & Williams Steel Forging Corp.**, Alliance, Ohio. He was senior engineer in the development and research department of North Electric Co., and responsible for quality control engineering.

Robert A. Barker was made manager of engineering, wire and cable division, **Electric Auto-Lite Co.**, Toledo, Ohio, a new post. He was assistant chief engineer for the division. **Fred Wetzel**, former chief engineer, was named engineering consultant for the division until retirement in April.

Robert P. Jensen was appointed sales manager, foil and container division, **Kaiser Aluminum & Chemical Sales Inc.**, Chicago. **Nicholas A. Cooke** was named division product manager. Regional sales managers for the division are: **Francis X. Curtin**, eastern region, with headquarters in New York; **Frederick C. Jones**, Great Lakes region, Cleveland; **F. Ashton Smith**, western region, Oakland, Calif.; **William H. Sims**, midwest region, Chicago.

OBITUARIES...

Cliff R. Crawford, 68, vice chairman, **Black-Clawson Co.**, at Middletwon, Ohio, died Jan. 31. He resigned as president of the company in September, 1957.

W. Ronald Morse, 69, former executive vice president, **Stanley Works**, New Britain, Conn., died Feb. 6.

Edward F. Maneely, 79, president, **John Maneely Co., Wheatland Tube Co.**, and **Wheatland Steel Products Co.**, Philadelphia, died Feb. 7.

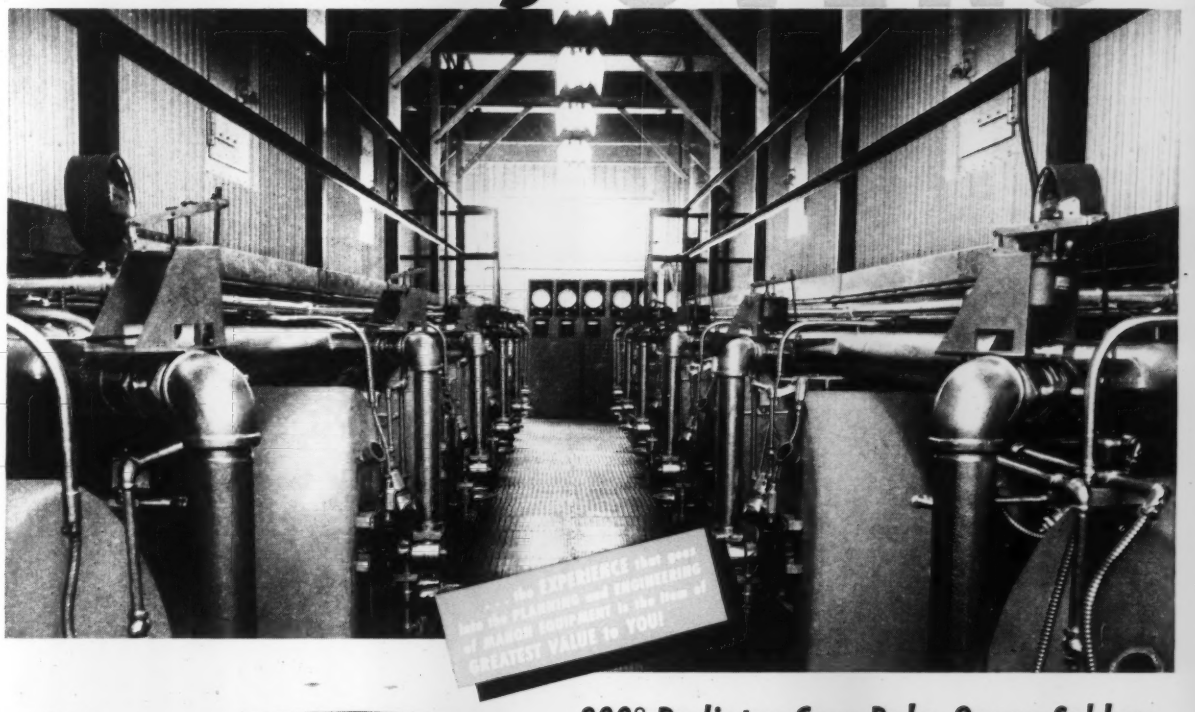
Wilber G. Somes, 63, district manager of sales in St. Paul for **United States Steel Corp.**, died Feb. 8.

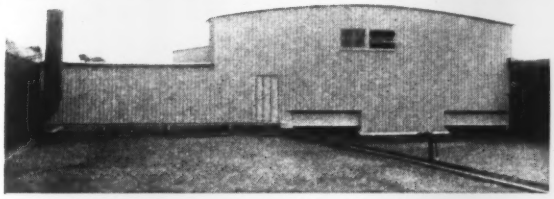
Leo P. Fagan, president, **Braden Steel Corp.**, Tulsa, Okla., died Jan. 26.

F. E. Ericson, 59, former president, **Barden Corp.**, Danbury, Conn., died Feb. 6.

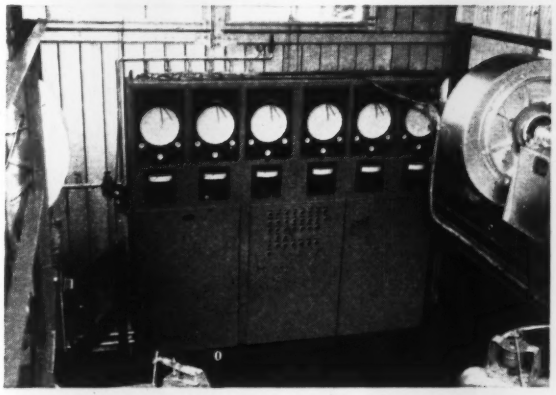
John L. Warner, 62, superintendent of **Youngstown Sheet & Tube Co.'s** coke plant, South Chicago, Ill., died Feb. 7.

Processing OVENS





Exterior View of Oven Housing on Roof of Plant. Walls and Roof are Incombustible, Double Rib, Interlocking Rolled Steel Plates.



Control Panel which Contains Starters, Temperature Indicators, Temperature Recorders, Safety Devices and Emergency Cut-Offs.

800° Radiator Core Bake Ovens Solder Radiator Tubes and Center Cores!

The Core Bake Ovens, illustrated here, were recently installed and housed by Mahon on the roof of an automobile radiator manufacturer's plant. The two parallel ovens, which normally operate at 800°, were designed for emergency temperatures up to 1000°. Each oven has six heating zones . . . controls, temperature recorders, safety devices and automatic emergency cut-offs are contained in one compact control panel. The exterior housing which encloses the two ovens, and conveyor lines to and from the ovens, is an integral part of the oven construction on two sides. This installation is typical of thousands of Mahon solutions of production problems demanding specially engineered processing equipment. When you are in need of a special processing oven, or special production equipment of any kind, you will want to discuss your requirements with Mahon engineers . . . you'll find them better qualified to advise you on both methods and equipment requirements. And, because Mahon can point to over thirty-five years of successful operation in this highly specialized field, and has the ability and facilities to handle any type of project large or small, you can be assured that their advise and recommendations will be sound and unbiased. See Sweet's Plant Engineering File for information, or write for Catalogue A-658.

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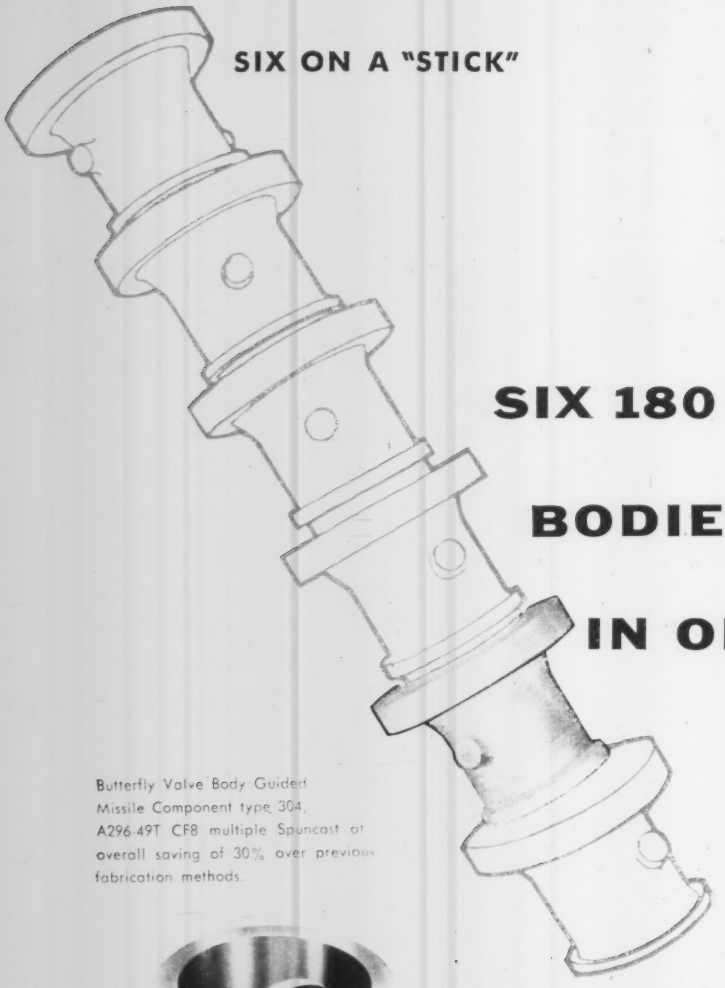
Engineers, Fabricators and Erectors of Special Processing Ovens of All Types; Metal Cleaning and Rust Proofing Machines; Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Complete Comveyorized Finishing Systems; Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and Many Other Units of Special Plant and Production Equipment.

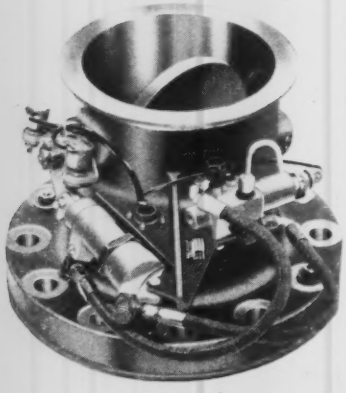
MAHON

SIX ON A "STICK"



SIX 180 LB. VALVE BODIES SPUNCAST® IN ONE PIECE

Butterfly Valve Body Guided Missile Component type 304, A296-49T CF8 multiple Spuncast at overall saving of 30% over previous fabrication methods.



Here's an opportunity to take advantage of one of the most cost saving techniques in modern casting practice—*ESCO* Spuncast Multiple Casting. You can cut fabrication and machining time to a minimum, save on material costs with definite improvement in quality.

Whether your problem is one of heat, corrosion, impact, abrasion or alloy availability, the *ESCO* engineering staff will help you plan for greater savings in time, material and money with *ESCO* SPUNCAST.

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IN CANADA ESCO LIMITED

Powdered Metals

New ball mill at Walmet's Detroit plant will boost capacity and improve product quality

A BALL MILL for blending high-priced metals in powder form is being installed at Walmet Corp., Detroit. It will raise capacity of the plant about 30 per cent and improve product quality.

The mill will be used to process larger batches of such powdered metals as cobalt and carbides of tungsten, titanium, and tantalum, says E. R. Almdale, president. The mill has a capacity of 800 lb. This is considered huge in the carbide industry since end-products of carbide metals usually weigh only a few grams.

Benefits—Advantages of processing these powdered metals in large batches, Mr. Almdale says, are:

1. Less contamination. The larger the batch, the less need for handling, thus less chance of getting foreign elements in the mix.

2. Elimination of frequent analysis and adjustments in subsequent processing operations.

Small loads of mixed powders, he explains, require frequent analysis to determine the characteristics of each mix, and constant altering of shrinkage allowance in sintering, pill pressing, forming, and other operations to conform with the previously determined characteristics.

Orders Reheating Furnaces

Inland Steel Co. has awarded a contract to Salem-Brosius Inc., Pittsburgh, for the design and erection of two 4-zone furnaces for its structural mill at Plant No. 2, Indiana Harbor, Ind. The furnaces, operating on coke oven gas or fuel oil, will be used to reheat steel blooms preparatory to rolling. Each furnace is rated from 75 to 120 tons an hour.

Buys Nathan Trotter Co.

Frank Samuel & Co. Inc., Philadelphia, a subsidiary of Haile Mines Inc., New York, acquired the New York business and office of Nathan Trotter Co., importer of metals. Frank Samuel will act as agent on Straits and other pig tin for Edward Boustead & Co. Ltd., London, England. The newly acquired property will be known as Frank Samuel & Co. Non-Ferrous Div. with offices at 24 State St., New York, N. Y. Officers of this division include R. C. Clark and H. D. Wallach, vice presidents, and R. C. Clark Jr., assistant vice president.

Enters Missile Field

Minneapolis-Honeywell Regulator Co., Minneapolis, holds a major contract to make automatic control systems for ground facilities involving "several prominent U. S. missile programs." Production will begin in a few months. The company has formed a Missile Equipment Div. to consolidate its interests and activities in that field.

Western Gear Expands

All San Francisco Bay area operations of Western Gear Corp., Lynwood, Calif., are being concentrated at the company's Belmont Works. A number of new buildings, as well as enlargement of present structures at the Belmont plant, are now underway. The Industrial Products Mfg. Div., now in downtown San Francisco, will be at Belmont under the supervision of Al Croci, superintendent.

To Make Induction Heaters

Pittsburgh Induction Heating Co. Inc., a new firm manufacturing induction heaters, opened offices at 3945 Middleboro Rd., Pittsburgh, Pa. Officers are: President, T. L. Welsh; vice president, R. L. Miller; treasurer, J. Barr Haines; and secretary, J. P. McComb Jr.

Realigns Purchasing Unit

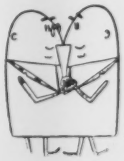
Purchasing offices of Brainard Steel Div., Sharon Steel Corp., have been separated. All purchasing functions of the Larchmont Avenue plant (steel strapping, strapping tools and accessories, electrogalvanized strip, painted and lithographed strip) as well as those for the Engineering Research & Development Dept. are under the supervision of J. Carl Nivus with offices at the plant in Warren, Ohio.

Asarco Installs Furnace

American Smelting & Refining Co., New York, has placed in operation a large copper melting electric furnace at its Perth Amboy, N. J., plant. The furnace (18 ft in diameter and with a bath capacity of 90 tons of molten metal) can continuously produce 30 tons of pitch copper an hour, or a ton every 2 minutes. It employs three 18-in. diameter graphite electrodes. When assembled, each weighs 4000 lb. It is the largest hydraulically controlled direct arc furnace in this country, including furnaces for steelmaking, the company claims.

Metal Fabricator Renamed

Novelty Steam Boiler Works Inc., a subsidiary of Ellicott Machine Corp., Baltimore, has been renamed Ellicott Fabricators Inc. The company specializes in production of pressure vessels and special metal fabrications.



CONSOLIDATIONS

Maxwell Industries Inc., Ashtabula, Ohio (formerly at Macedonia, Ohio), manufacturer of gages and tools for boring, reaming, recessing, and form work, acquired **Kiener Cutting Tool Co. Inc.**, Cleveland.

International Steel Co., Evansville, Ind., acquired **Lindsay Structure Inc.** and will operate the property as a division.

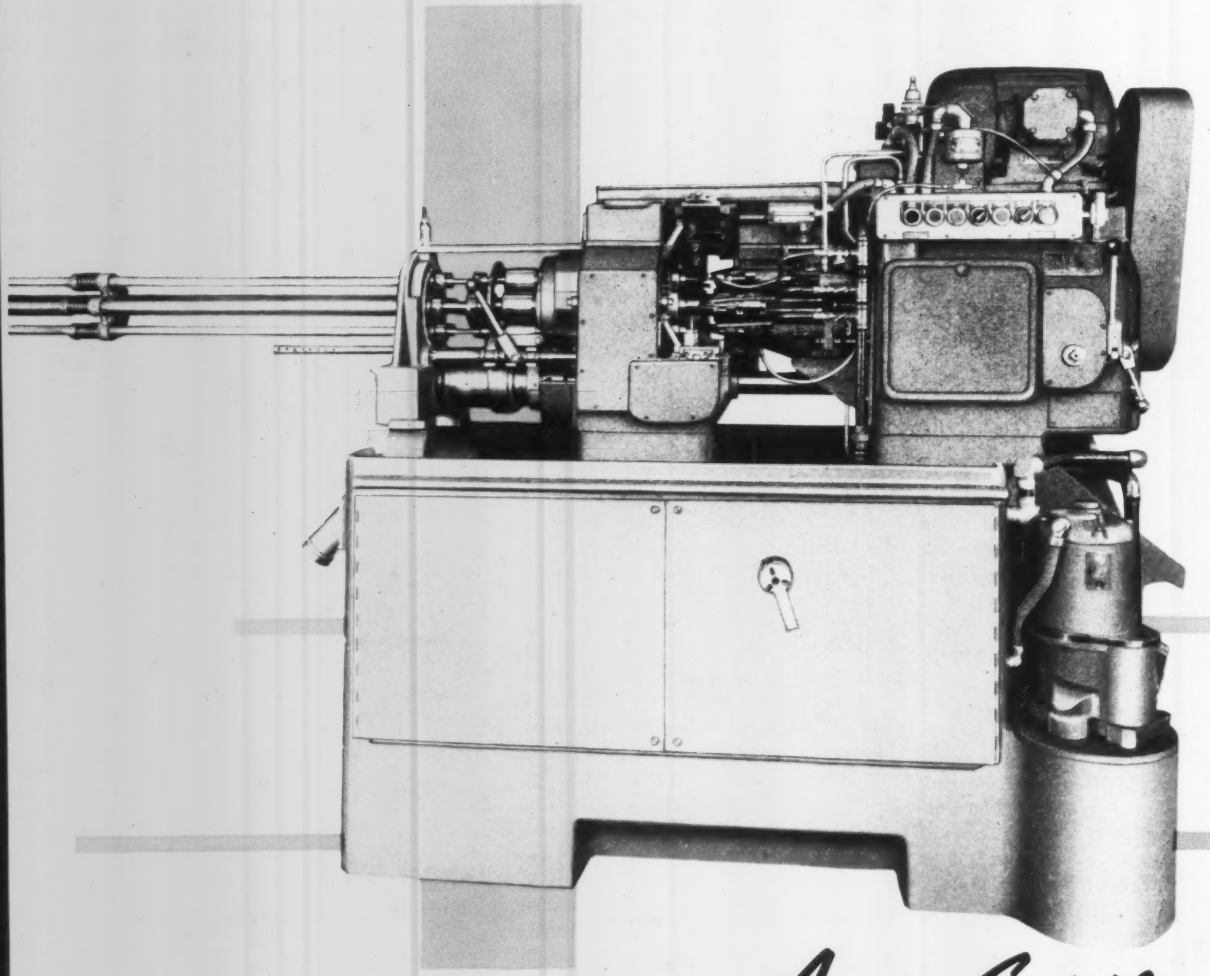
Brush Beryllium Co., Cleveland, purchased **Penn Precision Products Inc.**, Reading, Pa. Brush will continue operation of the precision strip producing facility under the name of Pennrold Div. E. M. Smith is the divisional manager.

Raytheon Mfg. Co., Waltham, Mass., purchased **Applied Electronics Co. Inc.**, South San Francisco, Calif., and its associate, **Apelco Sales Corp.** Applied Electronics makes marine radio-telephone equipment.

Industrial Brownhoist Corp., Bay City, Mich., has been sold to **American Steel & Pump Corp.**, New York. Max Reibenack, president of the Bay City firm, says the pres-

(*Please turn to Page* 66)

NAMCO Standard Quick-change tooling available on . . . .



this all-new *Acme-Gridley* 7/16"-Six Spindle Bar Automatic gives you the lowest cost per piece.

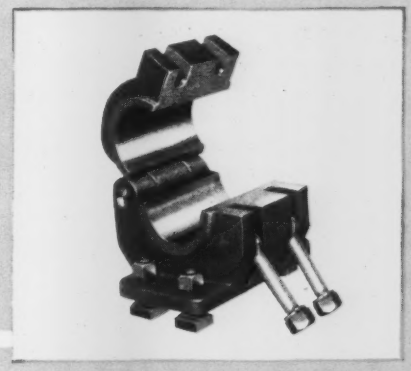
HIGH PRODUCTION ACCURACY — sustained at highest speeds and feeds through proper weight distribution and support of toolholders without overhang.

WIDE TOOLING VERSATILITY — through independently operated cross slides, spindle stopping (option) and a variety of standard and special attachments.

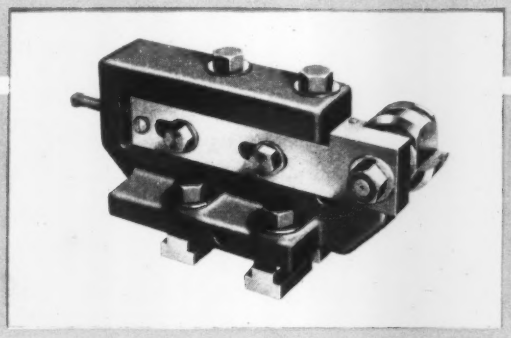
LONG OPERATING DEPENDABILITY — extra reserve power—strength for top performance with *all* tools.

. . . the new 7/16" Six as on all Acme-Gridley machines—supplied as standard equipment—at standard tooling prices

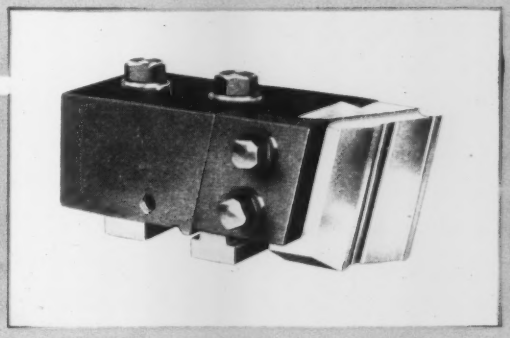
Production efficiency is measured by the total cost of the job run. The "quick-change" tooling of Acme-Gridleys, in addition to their other outstanding high output characteristics, assure low costs on all production runs. Illustrated here are three of the many "quick-change" toolholders available for all size Acme-Gridleys, which require only the simplest of gauging on the machine when setting up or resharpening.



Hinged type toolholder allows quick-change side removal of drill bushings, counterbores and shank type toolholders by simply loosening two clamp bolts.



This "quick-change" toolholder permits the circular tool and block to be removed for tool sharpening.



Only two bolts need be loosened to release the tool for sharpening in this Dovetail Toolholder. A simple straight edge can be used to accurately align the tool when it is replaced.

Find out more about "quick change" tooling as engineered into Acme-Gridleys for lower total production costs.

National Acme

THE NATIONAL ACME COMPANY, 189 E. 131ST STREET, CLEVELAND 8, OHIO • Sales Offices: Newark 2, N.J., Chicago 6 Ill., Detroit 27, Mich.

(*Concluded from Page 63*)

ent management will continue to operate the company.

Jiffy Metal Products Co., Canton, Ohio (subsidiary of Campro Products Inc.), purchased **Affolter Mfg. Co.**, that city, fabricator of aluminum and steel products.

Morley Machinery Corp., Buffalo, purchased **Davis Keyseater Co.**, Rochester, N. Y., manufacturer of machines and cutters used to cut keyways in gears and pulleys.

Gabriel Co., Cleveland, acquired **Bohanan Mfg. Co.**, Los Angeles, manufacturer of force ejection systems for missiles and jet aircraft, plus hydraulic, fuel, pneumatic, and electrical components for the missile and aircraft industries.

NEW OFFICES

Warner & Swasey Co., Cleveland, opened a district sales office at 120 Halstead St., East Orange, N. J. G. W. Herkner is district manager.

Louis Allis Co., Milwaukee, electric motor manufacturer, opened a sales office in Toledo, Ohio, with E. E. Valmore in charge.

Dow Chemical Co., Midland, Mich., opened a sales office at 1505 Elm St., Dallas, Tex. Donald P. Camp is the branch manager.

National sales headquarters for the **Olin Aluminum Div.**, **Olin Mathieson Chemical Corp.**, New York, have been moved to 400 Park Ave., New York.

NEW PLANTS

Albert Pipe Supply Co. Inc. opened a $1-million facility at Varick and Johnson Avenues, Brooklyn, N. Y. It'll supply tubular products and accessories made of aluminum, steel, wrought iron, and plastics.

James Howden & Co. of Canada Ltd. is erecting a plant and office building in Toronto. The company produces blowers, dust collectors, compressors, and air preheaters.

ASSOCIATIONS

L. F. Hickernell, vice president-engineering, Anaconda Wire & Cable Co., New York, has been nominated to be 1958-59 president of **American Institute of Electrical Engineers**, that city. Vice presidential nominees are: L. C. Holmes, Stromberg-Carlson Div., General Dynamics Corp., Rochester, N. Y.; J. R. Kerner, Westinghouse Electric Corp., New York; R. B. Gear, Commonwealth Edison Co., Chicago; I. T. Monseth, Westinghouse Electric Corp., St. Louis; J. M. Nelson, Seattle City Light, Seattle; W. H. Chase, Ohio Bell Telephone Co., Cleveland. Nominated to be treasurer is C. H. Linder, General Electric Co., New York. Nelson S. Hibshman was renominated secretary.

Dr. B. D. Thomas has been elected president of the **Battelle Memorial Institute**, Columbus, Ohio.

American Society for Abrasives, New York, elected these national officers: Chairman, Ted J. O'Connell, Macklin Co., Jackson, Mich.; president, J. Y. Arnold, Carpenter Steel Co., Reading, Pa.; vice president, R. E. Ryder, General Electric Co., Lynn, Mass.; secretary and general counsel, J. L. Deelman, Reading; and treasurer, W. J. Miller, Mt. Penn Trust Co., Reading. The society, organized in November, 1956, plans to establish chapters in Cleveland, Chicago, and St. Louis, making a total of 11. Being considered are a research department, uniform standards for abrasives, and training programs.

W. D. Staley, Durion Co. Inc., Dayton, Ohio, has been elected president of **Hydraulic Institute**, New York.

Dr. F. E. Myers has been appointed laboratory director of the **Argonne National Laboratory**, Lemont, Ill.

Gilbert Merrill of the Gilbert Merrill Steel Corp., Mineola, N. Y., was elected president of **Association of Steel Distributors Inc.**, New York. Vice presidents are Saul Bradburd, Interstate Iron & Supply Co., Philadelphia, and Walter Ising, Laube Steel Co., Chicago. Secretary is Jack Jacobs, Jacobs Metal Sales, Toronto, Ont.; treasurer, Arnold Hanson, Amay Steel Co., New York.

National Constructors Association, New York, elected C. B. Whyte, Procon Inc., Des Plaines, Ill., president, and W. R. Wood, Girdler Corp., Louisville, vice president.

Paul C. Ackerman, Chrysler Corp., Detroit, has been elected chairman of the Engineering Advisory Committee of the **Automobile Manufacturers Association**, Detroit. Ralph H. Isbrandt, American Motors Corp., has been named to the committee.

NEW ADDRESSES

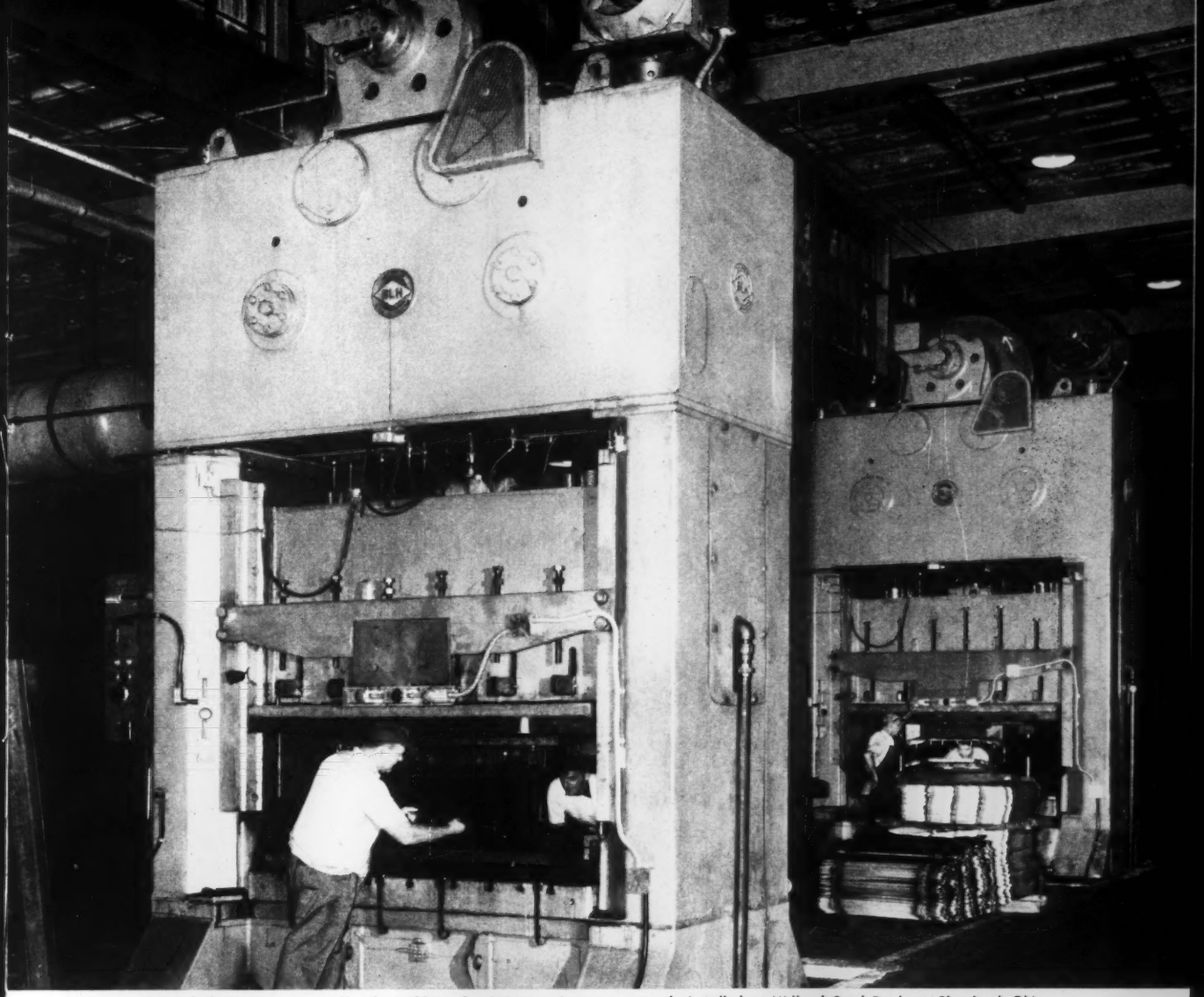
District headquarters of **U. S. Steel Corp.'s Cyclone Fence Dept.** have been moved to 13600 S. Brandon, Chicago, Ill. All warehouse, sales, and erection activities of the district are at the new address and will continue under the supervision of A. C. Correll, district sales manager. J. E. Brown is general manager of Cyclone Fence and vice president of American Steel & Wire Div., Cleveland.

Jeffrey Mfg. Co., Columbus, Ohio, moved one of its district offices from Beckley, W. Va., to 1702 Jefferson St., Bluefield, W. Va. District managers are G. S. Kepley, Industrial Div., and W. G. Montgomery, Mining Div.

REPRESENTATIVES

Damascus Tube Co., Greenville, Pa., appointed these new representatives: Atlantic Tube & Metals Inc., Wayne, N. J.; and Baden Equipment & Construction Co., St. Louis.

Kurt Orban Co. Inc., Jersey City, N. J., has been appointed distributor in the U. S. and Canada for rolling mills manufactured by J. Banning AG, Hamm, Western Germany. This marks the first time these machines have been available in North America.



Pictured above are two new Hamilton 400-ton 2-point eccentric presses recently installed at Midland Steel Products, Cleveland, Ohio.

Versatility of Hamilton presses praised by Midland Steel Products

Four new Hamilton-built production presses were recently installed in the frame plant of Midland Steel Products, Cleveland, Ohio. Assistant to Plant Engineer Haldon R. Falquet describes these presses as "extremely versatile and flexible." Currently they are producing parts for 1958 model cars, but they are designed to accommodate the still larger parts now on the drawing boards for 1959 and 1960 models.

Mr. Falquet reports that in his experience there are numerous applications where Hamilton Presses "most often have proved satisfactory in meeting Midland's demands for the required tonnage, shut height, stroke and clearance between columns which enable us to meet our customers' specifications." One of the many Hamiltons in service at Midland is a 4000-ton press—the largest of its kind in the country—and turning out huge side rails for trucks and buses in a single hit.

Let us discuss your press problems with you. Perhaps our know-how in press building can save you money or improve your product—or both!

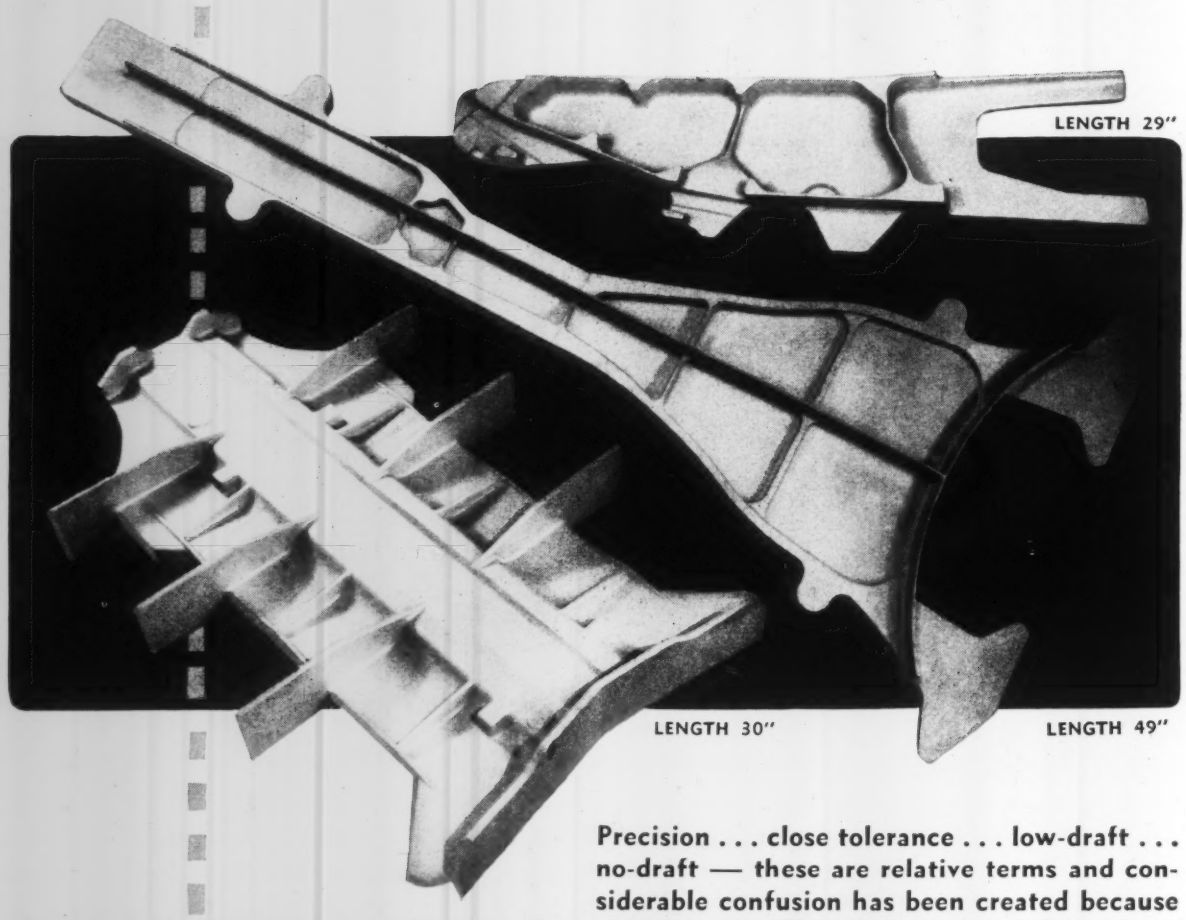
Hamilton Division Hamilton, Ohio

BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools

BALDWIN · BLH · LIMA-HAMILTON

PRECISION FORGINGS By WYMAN-GORDON



Precision . . . close tolerance . . . low-draft . . . no-draft — these are relative terms and considerable confusion has been created because they have been loosely used. Close tolerances on large forgings have been pioneered by Wyman-Gordon over the years. The degree of precision which is practical now becomes a question of economics.

The forgings illustrated are typical of Wyman-Gordon close tolerance forgings that have been produced in quantity. In solving problems of tolerances, design and metallurgical quality, there is no substitute for Wyman-Gordon experience.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

Technical Outlook

BOLT WITH A HOOKER— Users of Dardelet-type and high tensile bolts will be interested in a newcomer, tentatively called the High Tensile Bearing bolt. About to be released by Lamson & Sessions, Cleveland, it has hooked knurls on the shank. Advantages claimed: Under loads near the yield point, joint slip is far less than that of high tensile bolts; paint has little or no effect on joint behavior. The new design overcomes comparatively large hole misalignments, reducing the need for drifting or reaming.

MORE POWER TO WELDERS— This week in New York, A. O. Smith Corp. will take the wraps off a 1500-ampere power source which can handle up to 40 welding stations. The Milwaukee firm says it's designed to replace scattered generator sets, save space, cut maintenance, and increase flexibility. Operators can adjust the power without leaving their stations. Applications: Shipbuilding, bridge and steel construction, and manufacturing that requires short duty cycles at widely scattered locations.

ALCOHOL ATMOSPHERES— Growing interest in carburizing atmospheres produced from alcohol-water mixtures prompted a series of experiments by the Incandescent Heat Co. Ltd., Smethwick, England. Conclusions: 1. Gases obtained from methanol are better than those from isopropyl alcohol and water because they contain less CO_2. 2. An electrically heated vaporizing and reaction tube of 37/18 nickel-chrome alloy does an excellent job of catalyzing the reaction, and additional catalysts do not improve the reaction rate or carburizing ability of the gases produced.

MACHINABLE CARBIDE— A new carbide, known as Ferro-Tic, has a composite structure that can be annealed and quench hardened by conventional heat treating procedures. In the annealed state, it is readily machinable. Once hardened, it has high wear resistance which is derived partially from its hard carbide phase and partially from a hardened matrix. In progressive blanking of 0.008-in. cadmium plated beryllium copper, a die and punch set made with Ferro-Tic inserted sections produced 13 times as many parts between sharpening as previously used tool steel sections, says Sintercast Corp. of America, Yonkers, N. Y., which is marketing the material.

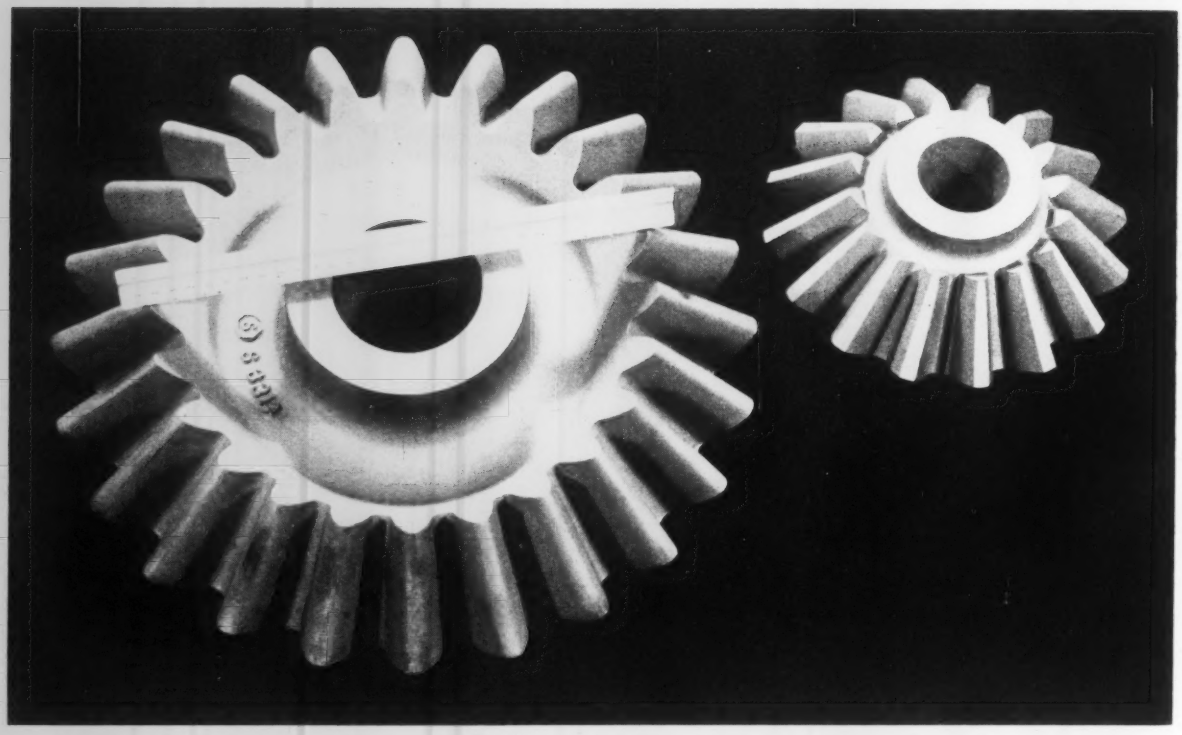
FLATTER TOOLING PLATES— The flatness of magnesium tooling plates has been upgraded, says Dow Chemical Co., Midland, Mich. Improved rolling and annealing techniques permit a one-third reduction in guaranteed deviation from flatness.

COUNTERBORE TECHNIQUE— Replacing the handle on a light drill press with a torque wrench offers a solution in counterboring to close tolerance depths. It allows exact control of force against the preset stop. In one case, the technique allowed holding the depth of a counterbore on a small cylindrical part to 0.025 in. plus or minus 0.001 in. Torque needed on the wrench was 90 in.-lb. The shop used a signalling-type wrench, with momentary release at the preset torque, made by Sturtevant Co., Addison, Ill.

NEW COOLING TOWER— Industry should be interested in a portable water cooling tower developed by the U. S. Army. It permits re-use of about 90 per cent of the water consumed by a plant each minute. The unit was designed for a liquid carbon dioxide generating plant which requires about 200 gallons of water a minute for cooling.

USE FOR OXIDE FILMS— Westinghouse Electric Corp. scientists are using the oxide from aluminum foil—about 1 millionth of an inch thick—in the construction of experimental electronic imaging tubes. It's used to support layers of sensitive material. Because of its extreme thinness, the oxide lets electrons penetrate the sensitive layers without being interrupted by a supporting structure. To get the film, the scientists etch away the foil, leaving the aluminum oxide, which is 25 to 50 molecules thick.

Metaworking Outlook—Page 29 Market Outlook—Page 109



Gears are formed to size

Shell Molds Add to Steel's Uses

Close tolerances and smooth surfaces give castings versatility. Here are some examples taken from the Third Product Development Contest of the Steel Founders' Society of America

Bevel Gears

THE GEARS shown above are accurately made by shell molding. One weighs 26 lb, the other 123 lb. Their pitch diameters are 9.7143 in. and 16.877 in.

A Replacement — The desired tooth form could not be obtained by a less accurate molding method, and the customer considered machining because small surface imperfections had to be removed.

Shell molding proved to be the answer to the problem of tooth form, general accuracy, and surface smoothness, says American Steel Foundries, East Chicago, Ind.

Performance — The gears have been tested without lubricant at double their normal surface speeds. They ran quietly and within normal allowances for backlash.

Aircraft Clutch Part

This important part is located between a gas turbine engine and a transmission. Shell molding proved to be the best way to make it.

Background—There is good precedent for using steel castings in aircraft structures: In World War II, Germany used them extensively. The Messerschmitt 109 fighter had as-cast parts that required only some spot machining. They were sometimes subjected to complex multidirectional high alternating stresses.

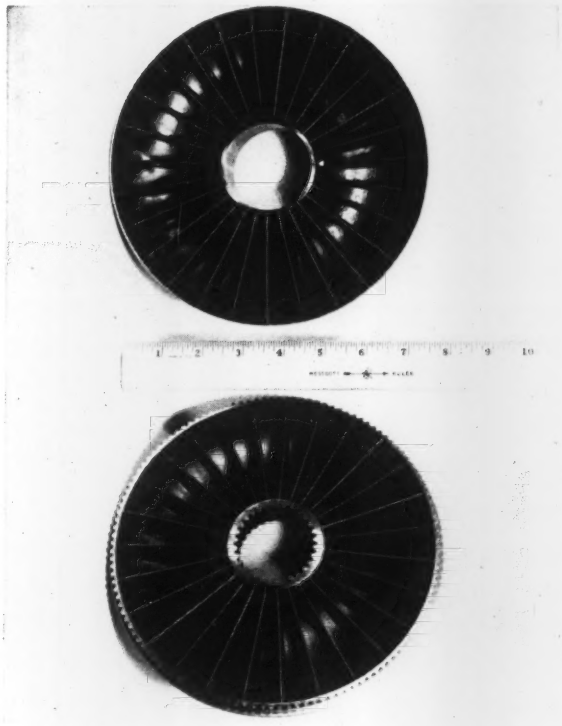
Modern British transports using steel castings have piled up good service records.

Aircraft designers in this country are looking more and more to this type casting. Vertol Aircraft Corp., Morton, Pa., uses a number of them in its helicopters.

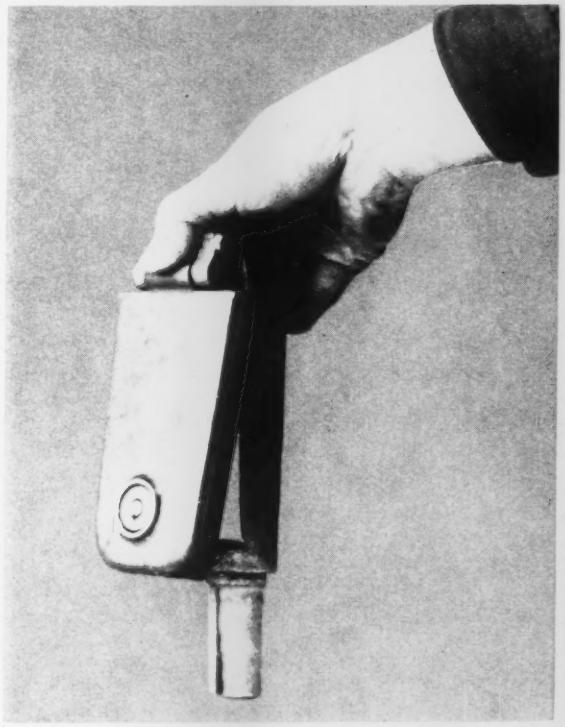
Quality—Reliable quality control methods insure the production of castings relatively free of porosity, inclusions, and cracks. Early discovery of defects is made possible by modern inspection methods, such as x-ray, gamma-ray, ultrasonics, magnetic particle, fluorescent magnetic particle, and fluorescent penetrant.

Ten per cent elongation and 150,000 psi tensile strength are common.

Tough Requirements — Vertol's



Clutch meets aircraft demands



Parking meter part is stronger

aircraft clutch had to withstand a torque of 15,600 in.-lb (or 2500 hp) at 14,200 rpm. It had to pass a spinning test of 5 minutes at 15,800 rpm with oil and 17,500 rpm dry.

The parts are required to be dynamically balanced within 0.1 oz-in. and have a strength of 150,000 to 170,000 psi.

Howard Foundry Co.'s Milwaukee plant cast the parts in shell molds from 4140 steel. The castings were heat treated to 150,000-170,000 psi with practically no distortion.

The clutch exceeded specifications. Parts withstood spinning at 16,000 rpm for 5 minutes with oil.

Parking Meter Part

This lid for a parking meter protects against pilferage. The part it replaces could be jimmied with a pinch bar because it lacked strength.

Massillon Steel Casting Co., Massillon, Ohio, picked steel to withstand abuse in service. Shell molding was chosen because it provided the smooth surface required for a salable product.

Advantages — Shell molding reduced machining requirements 80 per cent. The lock is assembled through the hole in the bottom of the lid. Shell molding holds the required tolerance of ±0.005 in. per inch on the lock hole.

Most important, the part cannot be pried open.

Gas Fittings

This part is on the market because of shell molding, says M. B. Skinner Co., South Bend, Ind. It is one of the take-off devices the firm makes for piping gas to homes.

Development of the cast steel part was a must because of the terrific increase of welding in the gas industry.

How It Works—The base of the fitting is welded to the gas main. Then the end of the pipe leading to the house is inserted in the side outlet of the fitting and socket welded in place.

After the service pipe to the house is connected to the meter, the valve can be made ready to turn on the gas. A check valve is dropped into the top of the fitting and seated with a single hammer blow. It will withstand a pressure of more than 1500 psi.

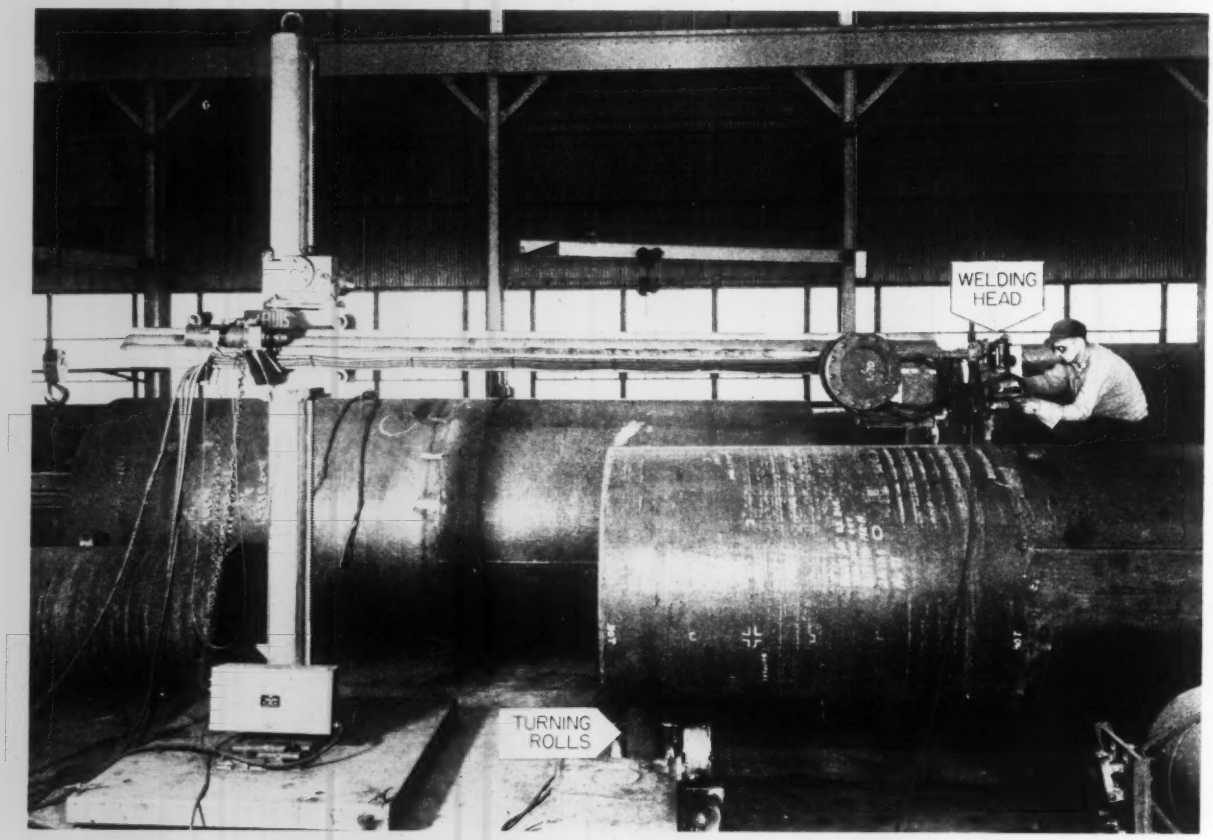
Next, a drill machine is screwed onto the external pipe thread on top of the fitting, and a hole is drilled through the main.

As the drill machine is removed and the drill retracts through the check valve (its inside bore acts as a guide), the valve flips shut and stops the gas until a final cap seal can be screwed on the external threads.

Why Shell Molding?—Only 1/32 in. is reamed from the valve seat, and the threads for the seal cap at the top of the fitting are cut without stock first being removed.

Two small stop pins cast in the bore prevent the side outlet pipe from going too far into the casting during socket welding. Because of the precise limits held by shell molding, no machining is needed in the side socket.

The fittings are made of 1020 steel to facilitate welding. They have a good finish and are gastight. Superior Steel & Malleable Castings Co., Benton Harbor, Mich., makes the castings.



COST CRISIS . . . How To Beat It

Automatic Welder

To replace hand methods, this firm chose submerged arc welding and a manipulator. The results halved manpower needs, improved quality. Investment ($7000) was repaid in less than a year

A YEAR ago, Gusset Boiler & Welding Inc., Canton, Ohio, welded its tanks manually. Joints needed a lot of preparation: A 60-degree V was flame cut 1/4 in. deep in the 5/16 in. boiler plate. After roll forming, an operator put down two beads inside the tank, finishing with one on the outside.

Output: One tank every 10 hours.

Tryout—Gusset's president, R. F. Hattersley, knew that automatic welding would be faster—if it could be applied. The main drawback: It's not economical for short, out-of-position welds.

His first step was a trial run with a Lincoln automatic welding head on the outside bead. Results: He completed the pass in half the time.

The next move: Engineers prepared some rough calculations for management from facts assembled by the shop staff. They decided a manipulator was needed to hold the welding head. Management made the decision to buy during informal discussions. Its rule of thumb: Equipment must pay for itself within 15 months.

THE PROBLEM: Cut cost of welding large steel tanks and increase production.

WHO SOLVED IT: Managers and engineers at Gusset Boiler & Welding Inc.

THE SOLUTION: A manipulator equipped with an automatic welder.

This manipulator solved Gusset's problem. It moves the welding head along seams or holds it steady while rolls turn the tank for girth welds

$60.36

SAVED PER TANK

OLD METHOD MANUAL

Labor ($6 per hour)	$63.60
Electrode cost	6.78
Edge Preparation (labor & materials)	21.00
Total	$91.38

NEW METHOD AUTOMATIC

Labor ($6 per hour)	$23.40
Wire & flux	7.62
Total	$31.02

Saves 66 Per Cent

Final Step — Gusset bought a manipulator from Lewis Welding & Engineering, Cleveland. Cost of power source, automatic welder, and manipulator came to about $7000.

The new method doesn't require joint preparation. Welds are completed in two passes and are done more than twice as fast.

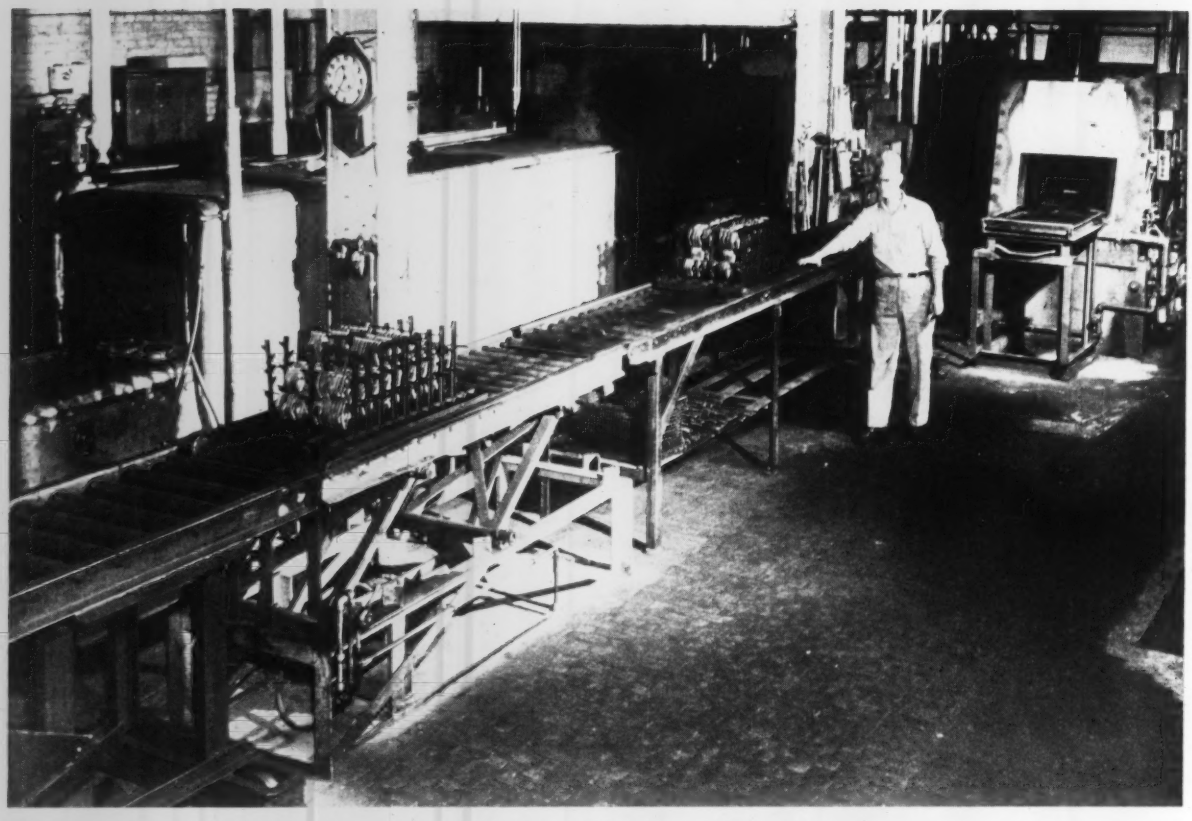
Output: One man finishes a tank in less than 4 hours.

The savings amortized the new equipment cost in less than a year.

Reasons — Automatic welding is fast and makes uniform, high quality welds. Such devices do more work than two operators with stick electrodes.

COST CRISIS COMPETITION

This article is part of a campaign to help industry achieve lower unit production costs. The accompanying example and others to follow are samples of what the editors of STEEL are looking for in their nationwide search for companies that have brought about important cost savings through more efficient use of capital equipment. Does your company qualify? If so, enter the Cost Crisis Awards Competition. See STEEL, Feb. 10, p. 54, and write to the Cost Crisis Editor, STEEL, Penton Bldg., Cleveland 13, Ohio, for your awards kit.



Here is conveyor system for three-in-one furnace. Section at left raises and lowers pneumatically, permitting easier access for loading. Section behind operator moves sideways

One Furnace Does Three Jobs

It carbonitrides, clean hardens, and straight hardens. Cast alloy fixtures resist severe temperature changes and gas atmospheres. Equipment requires only one operator

ONE heat treating furnace can do the work of three at Farmall Works, International Harvester Co., Rock Island, Ill., since installation of a specially designed conveyor system.

The firm produces a wide variety of small farm tractor products, each requiring a different heat treatment.

Two Problems — Farmall engineers had to: 1. Find a method of carrying a variety of parts to the furnace. 2. Produce the various physical properties needed with only one furnace.

Solution—They designed the conveyor with fixed and movable sections. Of the two fixed sections, one is permanently attached to the furnace entrance. A loading section can be raised or lowered pneumatically; two transfer sections can be moved laterally to the furnace, or to the washing machine. A flexible arrangement, it accommodates varying workloads. A second carbonitriding furnace can be loaded with the same conveyor system.

Operation—Cast alloy trays are placed on the loading section. They are loaded with shaft couplings, ratchets, and rail guides on hangers. The operator moves a lever to raise the loading section to the conveyor level. He pushes the tray over the permanent section to the transfer section which carries it into the furnace vestibule.

Three Requirements — A Lindberg GVRT furnace provides the multiple heat treatments. Although

THREE-IN-ONE FURNACE . . .

it is a batch-type unit designed for carbonitriding, it successfully handles bearing races, shaft couplings and ratchets. Surface hardness is closely controlled without scaling. The neutral gas atmosphere consists of endothermic generator gas with a dew point of 35 to 40° F. It is used at 380 cfh. Parts emerge from the furnace free of oxide. Farmall engineers call it clean hardening.

Hard Surfacing—Parts with important wear surfaces like rail guides or thrust plates are hardened by carbonitriding. It uses a mixture of generator gas, natural gas, and ammonia. Cycles vary from 1½ to 5 hours, temperatures from 1550 to 1650° F.

Clean hardening and carbonitriding are employed most often. Some parts like pump components are hardened by straight carburizing with no ammonia in the atmosphere.

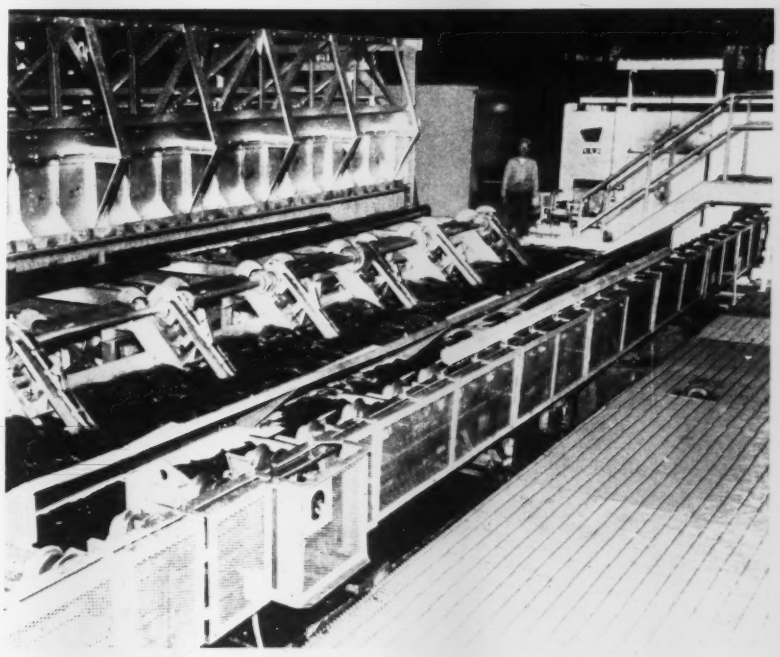
Cooling—All parts are normally given an oil quench after heat treatment. For an extremely hard surface and minimum distortion, the parts may be cooled in the furnace. They are held at 1300° F in an atmosphere containing no raw gas and twice the usual ammonia. At 300° F, the load is moved to the vestibule.

Fixture Life — These furnace parts were cast of 35-15 Ni Cr: Door bottom, carrier trays, basket carriers, roller rails, rollers, rail supports, roller rail spreaders, chain guides, and a fan.

Fan blades and hub are one piece. Formerly, wrought blades were fitted into the hub. A slight space between blades and the mating section was a nucleus for cumulative carburization. The cast design eliminates the difficulty.

All grids and associated fixtures, and the furnace parts are made of Type HT alloy. Farmall engineers report trays and fixtures last about a year. None of the furnace parts has been replaced since installation (1953).

Type HT has excellent hot strength and good life in rapidly fluctuating temperatures. An austenitic alloy, it withstands reducing and oxidizing atmospheres, doesn't carburize excessively, and doesn't use up nitrogen in an atmosphere.



Heat treating line for stainless bars lets . . .

Customers Call the Temper

STAINLESS STEEL BARS which are heat treated and normalized to customer specifications are being offered by Jones & Laughlin Steel Corp.'s Stainless Steel Div. at Detroit. A new installation, which includes two new furnaces, makes it possible for the former Rotary Electric plant to supply this product in a wide range of hardnesses.

Grades being treated include Types 403, 410, 416, 431, 420, and 440. Some typical uses: Steam turbine blades, valve and oil field parts, micrometer and pump components, and shafting.

The installation was engineered and installed by the Drever Co., Bethayres, Pa. It can heat treat stainless steel bars ½ to 4½ in. in diameter and up to 30 ft in length. Rated capacity is 400 tons per month.

Treating Sequence—As bars come from the rolling mill they are placed in a gas-fired hardening furnace which is capable of heating them to 1900° F. They are conveyed through the hardening furnace by a walking beam hearth; after the proper time at temperature, they are discharged by a roll drive. The bars are quenched in an oil bath at about 150° F.

After 20 to 25 minutes for cooling, they are lifted out of the bath by a chain conveyor, then fed into a gas-fired tempering furnace. Tempering takes ½ to 4 hours, depending on size. The work is conveyed through the furnace by endless alloy chains.

Mill Gains Versatility

Addition of a double cooling bed to the Morgan continuous rod mill at the Colorado Fuel & Iron Corp. in Pueblo, Colo., now makes it possible to produce straight, small diameter bars on the mill. Production of ⅜ to ⅝ in. reinforcing bars will be shifted to it from the 10-in. bar mill, freeing the latter for bigger sections.

Inspector (left) checks auto radiator cover for evidence of die wear. Epoxy die made 130,000 parts in 0.025 in. brass. Epoxy inserts (right) formed 65,000 panels in 0.035 in., cold rolled steel

Plastic Dies Get New Life

You get more production with formulas containing metal or glass fibers. Maker claims they provide greater strength and better heat transfer than older types

DIES made from Epoxy-Alloy, the latest plastics formula, show little sign of wear after deep drawing more than 150,000 parts. The material is 0.025 in. brass.

A product of Bakelite Co., a division of Union Carbide Corp., New York, it's an epoxy resin system reinforced with metal or glass fibers, faced with metal flocking.

Advantages claimed include: 1. Good thermal conductivity (it's equal to some grades of stainless—or 60 times better than present plastics). 2. Improved castability of large shapes with less production of heat. 3. Less shrinkage and brittleness than nonreinforced heat resistant epoxies.

Types — Bakelite makes three compositions: ES, reinforced with steel fibers with a face coating of steel fiber flocking; EG-SF, reinforced with glass fibers with a face coating of steel fiber flocking; and EA, reinforced with aluminum fiber with a face coating of aluminum fiber flocking.

Case History—Hotpoint Co., Chicago, made 65,000 refrigerator bottom panels with epoxy inserts in a draw and redraw die. The metal: 0.035 in. cold rolled steel. The inserts haven't been repaired, and they show little wear. The move chopped five weeks from a ten-week promise date for standard steel tooling.

Bakelite explains that its formulas extend savings in the making of prototypes. Such dies can make deep draws in $\frac{1}{4}$-in. stainless. The material is tough, machinable, and holds fast to inserts such as dowels, screws, and steel cutting edges.

Better Conductor—The EA epoxy castings conduct heat rapidly. The epoxy resin takes no more heat than competitive formulas, but the aluminum fibers make cooling less difficult than it is with powder or inert fillers.

A good example is the sand pattern. Many foundries use standard epoxies for them, but they are limited to cold sand. Such formulas don't work well with recirculating hot sand—there's too much sand drag.

One firm solved the problem with the EA formula with aluminum fiber reinforcing. Quick heat absorption from the hot air maintains a high surface temperature. So far, the patterns have turned out more than 100,000 sand molds.

Here are other applications for the EA formula: Precision metal casting molds, heated matched molds for low pressure use, vacuum forming molds, slush molding dies, foundry patterns; and hot stretch forming dies.

THEY *get to take a last look inside*

Standard Oil research develops method for inspecting lubrication of enclosed parts without disassembling

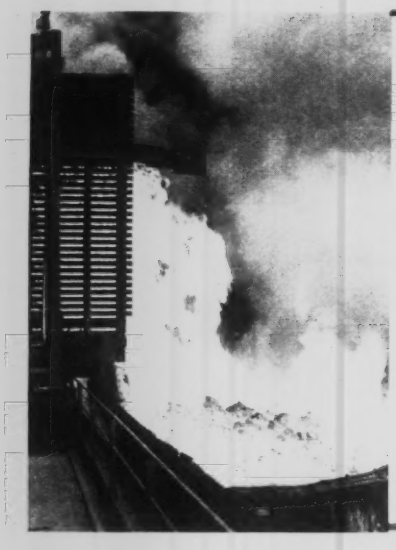
What if you had to make a final inspection of enclosed parts to be sure they were lubricated and you could not do it without disassembling? Standard Oil research scientists have just developed an instrument system that determines lubricant level in an instant. The device measures the density of an assembly so precisely the presence or absence of the desired quantity of lubricant registers on a meter.

Having such a unit might permit you to shorten an assembly line or reorganize assembly operations for greater convenience, speed, economy. The research men at Standard who developed this inspection method will be glad to share their know-how with you to help you fit it to your assembly operations.

This is the research pay-out you get from Standard. This is the "something more" Standard gives to industry besides the research which has established Standard Oil petroleum products as the industry criteria for quality.

For more information about this development or for assistance on other lubrication problems, inquire of any of the 48 Standard Oil district offices in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and get it!*



Six Ways To Keep Coke Quality High

1. Learn to use coals not considered first-class coking types. We can do it without hurting the quality of our coke.

2. Install multiple mixing bins or other adequate methods of blending at least four different coals at each large coke plant.

3. Get ready for the day when the sulfur in coal will be a valuable byproduct. Develop sulfur recovery equipment.

4. Learn more about the adding of inerts (carbon and otherwise) to help solve the rapidly diminishing reserves of low volatile coal.

5. Improve the design of storage bins and pulverization equipment to keep the mix homogeneous once it is made.

6. Put more research time on simple practical tests for coking coals—if necessary, at the expense of highly theoretical studies.

We Have Plenty of Good Coking Coal

Metallurgical coal reserves are growing; we continue to improve preparation techniques. If we apply our knowledge, we can keep our coke quality high

By PHILIP S. SAVAGE
Vice President
Donner-Hanna Coke Corp.
Buffalo

THE COKING COAL outlook is getting brighter all the time. We have more reserves than we had ten years ago.

First Reason — We are finding ways to get at more coal. The use of strip coal under careful supervision and the development of giant coal augers which bore out hard-to-get-at seams have made available a large amount of top-flight coking coal that was abandoned many years ago.

Second Reason — We've found that we can make good metallurgical coke from lower grade coals. Many steel plants have purchased huge reserves that they wouldn't have considered for coking purposes a few years ago. Mines are producing satisfactory coking coal from reserves once rated as steam coal reserves.

Much coal with 20 to 23 per cent volatile matter is being used for coking, in place of true low volatile coking coal (14 to 22 per cent volatile matter). At least four large coke plants are committed to this type coal on long term contracts, and many others will extend reserves of low volatile coal by raising the limits on the volatile matter they will accept.

Third Reason—Many plants have greatly improved their ability to properly mix and prepare their coals; some are adding to their number of mixing bins; others are blending in transit, particularly where water transportation is used. But we know of no one who has had nerve enough to abandon the large open storage bin (although its design has been greatly improved).

Most export coal is blended as it is loaded. By the time it is received at European coke plants, it is probably as thoroughly mixed as it is in a normal mixing plant. The practice is followed to some extent in loading our lake, river, and coastwise boats. At least one large coal company has bins that mix coal in transit for customers who do not have adequate facilities.

Mixing in transit should be encouraged. In addition to improving the coking qualities of the coal, it can add greatly to conservation.

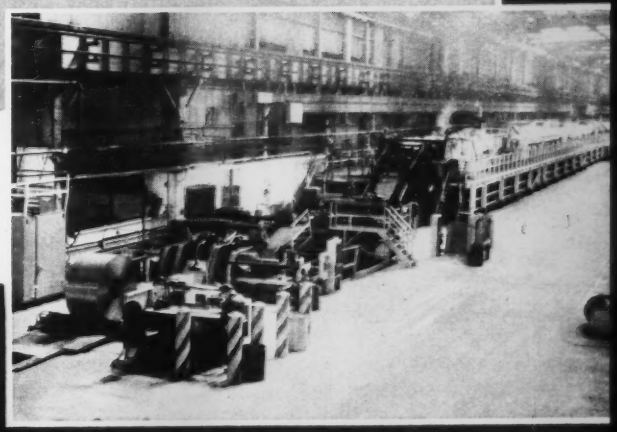
Sulfur—New and more efficient processes for desulfurization of iron outside the blast furnace have been developed. We are sure they will find increasing use as it becomes necessary to use higher sulfur coal.

Sulfur supply is adequate and low priced, but as reserves play out, sulfur in coal will become a valuable byproduct.

Inerts — The use of fine inerts (carbon or other materials which have no coking properties) has been greatly extended since 1949. Nearly all foundry coke used contains coal mix inerts in the form of fine anthracite, coke dust, or fine petroleum coke. The use of fine an-

HIGH-SPEED CONTINUOUS PICKLING LINES

Designed and Built by MESTA



MESTA HIGH-SPEED CONTINUOUS PICKLING LINES WITH TRIMMERS, UP-COILERS AND MESTA-THOMSON FLASH WELDERS

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY • PITTSBURGH, PA.

PLENTY OF COAL . . .

thracite in blast furnace coke has sharply decreased because of its high price.

For many years, Donner-Hanna Coke Corp. has made a silica coke for the production of ferrosilicon—a sizable percentage of fine silica sand replaces most of the normal low volatile coal. Fine flue dust and taconite concentrate have also been used to produce strong coke for the combined smelting of iron and to replace the sintering of the ore. Experimentally, inert char made from high volatile coal has been used at several plants in this country. It is regularly used abroad.

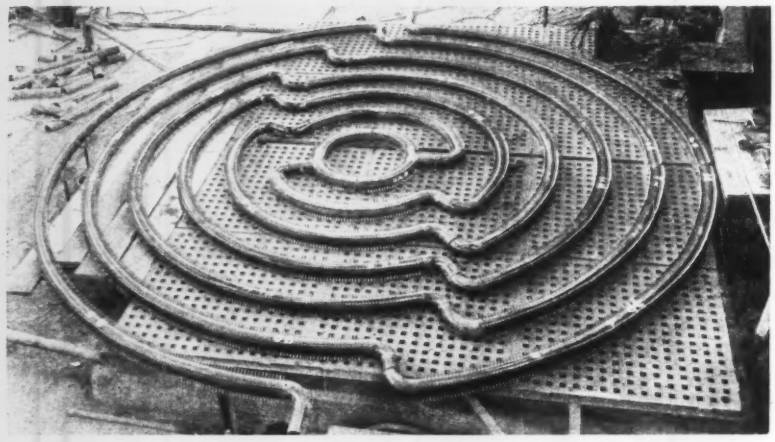
All inerts, if fine enough and properly mixed, strengthen a fluid coal mix. When the price of low volatile coking coal makes the use of inerts economically practical, we can make a satisfactory blast furnace coke without any of the low volatile coals we usually consider necessary.

Research—Most companies can't afford to spend much on pure research. Most of their studies should be closely tied to the plant and be limited to tests that are useful.

We think the research requirements of coke oven and blast furnace operators are covered by: A small oven for testing the expansion and contraction of coal; can or box tests of the coal or coal mix in regular coke ovens; strength tests in one of several types of tumbler barrels (we prefer one with a perforated drum); and chemical analysis, including a porosity test. All tests must be properly correlated with known coals or coal mixtures to be reliable.

Results Count — Our experience indicates that properly supervised tests, plus a visual examination of the product, can be highly accurate in forecasting results in the coke oven and blast furnace. We follow up with a short run in our quarter-size coal bin before using the trial mix in the blast furnace. The cost of such a test is in the hundreds of dollars, not thousands.

Cokemaking is an art, not a science, but science may give us hints for improvement. We believe the most value for the least money will come from practical work at the plant and that adequate blending equipment is our most helpful tool.



Large cooling coil for refinery with end-welded studs instead of heat-transfer fins

Studs Take Off Heat

Welded to the outside of a large cooling coil for Sun Oil Co.'s Toledo, Ohio, refinery, they provide an additional 200 sq ft of heat transfer surface

END-WELDED studs replace conventional heat transfer fins on a large cooling coil fabricated by Kaighin & Hughes Inc., Toledo, Ohio, for Sun Oil Co.'s Toledo refinery.

The coil (see photo) is 4-in. tubing which starts with an inner circle 5 ft in diameter and expands outward to a diameter of 32 ft. Studs are on 1-in. centers in rows 90 degrees apart. Two men welded 2000 studs per 8-hour day.

Application—The coil is for the Houdriflow unit at the Sun plant. In the original design, snuffing steam was used to reduce temperatures of the flue gases in the intermediate and bottom air-out zones of the catalyst regenerator.

This did not prove entirely satisfactory. The temperature was not always reduced enough to prevent afterburning in the outlet lines. Cooling coils were designed to reduce the flow gas temperatures below the combustion level. Feed water is put in and steam is taken off.

The pipe sections provide about 300 sq ft of heat transfer surface. The ½-in. diameter, 1¼-in. long Nelson studs welded to the outside of the pipe give an additional 200 sq ft of surface per coil.

Fabrication — Sections of pipe were bent to their required radius, location of the studs laid out, and the studs attached with a Nelson stud welding gun.

The coil was assembled on cribbing inside the vessel in the area directly below the air-out zone. After assembly, the coil was raised into place with cables dropped through the catalyst downcomer pipes. The coil was held in position and structural steel flat bars welded to the downcomer pipes directly below the coil to give adequate support.

The installation has reduced the temperature of the flue gases to below the combustion level, eliminating afterburning in the flue gas outlet lines. It has reduced the amount of snuffing steam required on the unit and at the same time produces considerable additional steam for process or refinery use.

IMPROVE DESIGN . . . *get assistance*

from Ferry Cap—fastener experts for 50 years

Often we can suggest a fastener of special shape that will reduce your over-all product costs. Sometimes these special screws eliminate parts, replace more expensive parts, or reduce assembly time. Frequently they improve product performance. In all cases, Ferry Cap customers get the benefit.

Give us a call and have a talk with one of our "Fastener Engineers."

THE FERRY CAP & SET SCREW COMPANY

Makers of the famous Countr-Bor® Screw for socket head applications.

2159 SCRANTON ROAD • CLEVELAND 13, OHIO

FERRY CAP *is geared to FASTER SERVICE*

DO YOU HAVE TO ANSWER THIS IMPORTANT QUESTION . . .

SHOULD WE MAKE OUR OWN OXYGEN?

Your decision on whether to buy oxygen or make your own can have an important bearing on the profitability and efficiency of your operation. In many cases, oxygen can best be supplied from an established producer. But your oxygen requirements may justify a plant of your own.

Messer Experience Can Help You Decide

Messer's broad experience in the design and engineering of air separation equipment has been of value to some of America's largest manufacturers. More than 1000 Messer-engineered plants are operating successfully all over the world (183 in the United States).

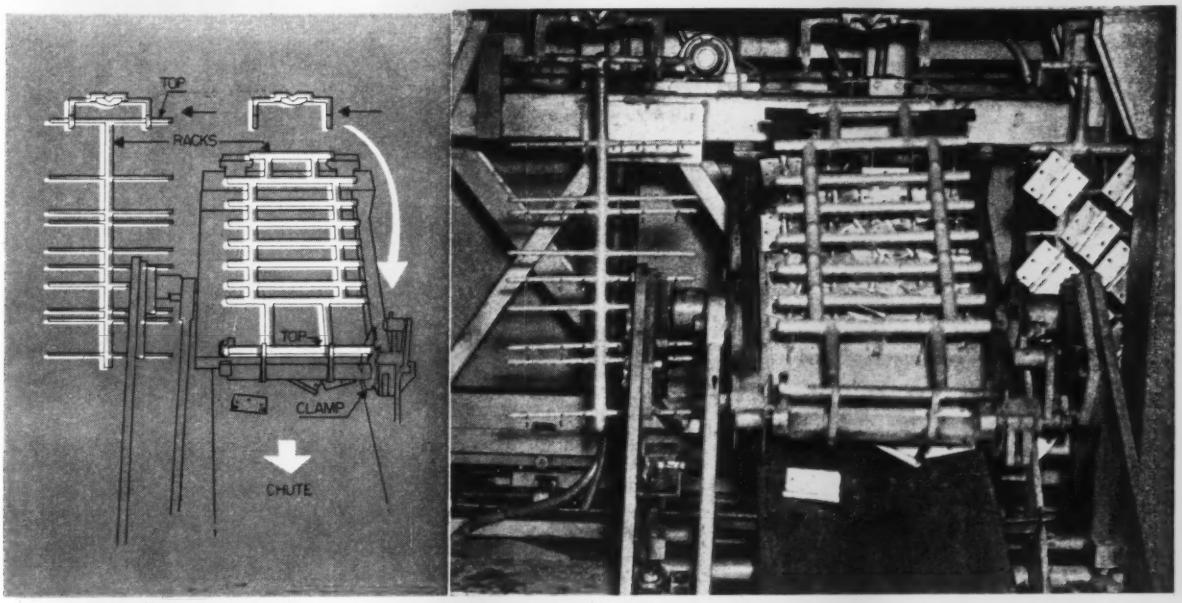
For unbiased and authoritative advice on oxygen or nitrogen production, consult American Messer. *We will welcome your inquiry.*

AMERICAN MESSER CORPORATION

CHRYSLER BUILDING · 405 LEXINGTON AVE., N.Y.C.

"There Is No Substitute for Messer Experience"

Messer



This device lifts racks off the conveyor hooks (top) of the new plater at Stanley. When racks reach flat position, hinges fall onto chute

Plater Unloads Automatically

Machine also features automatic stripping of bronze plating from racks, plating speeds up to 120 racks an hour, and central lubrication that gives the system a shot a day

A NEW automatic electroplater puts the finishing touches on door hinges at the Stanley Co., New Britain, Conn.

The machine plates up to 120 racks (2400 hinges) an hour. Its features: An automatic unloader which removes rack and product without marring its finish and an automatic chemical stripper which removes plating deposits from racks while they're in the machine.

Operation—The plater has a continuous conveyor system which carries racks and hardware items through plating and cleaning. Parts are loaded by an operator.

The first step is an electrocleaning, followed by two water rinses. The next is a 70 per cent nitric acid bath for stripping, followed by a cold and a hot rinse. (The secret of good plating, say Stanley engineers, is good cleaning and rinsing.) Here are the other operations which follow loading:

1. Cyanide bath.
2. Rinse.
3. Plate.
4. Two rinses.
5. Chromic acid rinse.
6. Two final rinses.
7. Manual unload (optional).

Plated parts are given two final hot water rinses and dried before reaching the automatic unloader.

Maintenance — The lifting and transfer system is centrally lubricated once a day. Hydraulic operation provides rapid travel without jerky stops.

Stanley expects its plating racks to last indefinitely. The reason: They're coated with a plastisol made by the Stanley Chemical Co., a subsidiary. It's a rubberlike substance applied as a liquid and later baked. With careful handling, the racks won't have to be recoated for many years.

Installation — The plater weighs about 110 tons and was made in three sections. It was installed on the fifth floor of the plant. Wagner Bros., Detroit, had to build the machine to fit into a tight area with a comparatively low ceiling. (When the transfer device is extended, it misses the ceiling by less than 5 in.)

Auxiliary—An automatic brushing machine at one end of the plater speeds preparation of plated butt hinges for final lacquering. Parts are placed on a rubber belt which carries the parts under fine wire brushes. Hinges are held on the belt by permanent magnets beneath the brushes.

MARKETS ON THE MOVE
No. 2 in a series of reports to Sales Management by Editors of STEEL

second half, '57:

Survey by STEEL Magazine's Editors Shows Market Changes Affecting Sales

This advertisement is a condensation of STEEL's latest findings in a series of management surveys in metalworking. The information you're about to read reflects the plans, opinions and hopes of some 5,000 management executives of metalworking plants, as discussed by STEEL's editors.

The major factors affecting metalworking business activity:

1. Sales for the second half of '57 are running 3.8% ahead of first six months' figures.
2. 1957 business volume will reach 138 billions, 3.2% more than last year's last six months.
3. Employment is up slightly; capacity is maintaining a healthy, steady growth.
4. Selling prices are being pushed up, the result of a 3.7% increase in costs. Profits will suffer.

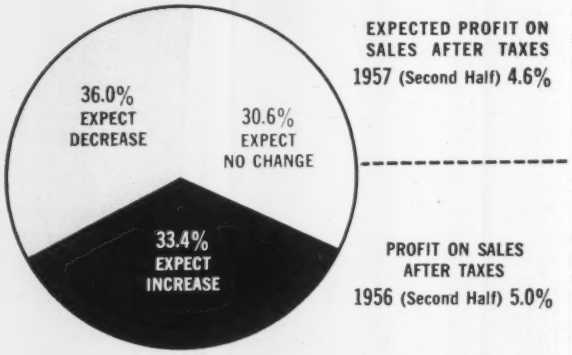
Prosperity has its problems

IRWIN SUCH, *Editor-in-Chief:* Ask any metalworking boss to tell you his troubles and he'll probably say just one word—"costs". Let's look for the reason.

WALT CAMPBELL, *Editor:* It's true second-half sales are running ahead of the first six months of this year. They're up 3.8%, and selling prices are up 1.7%. But even this boost in metalworking's income can't wipe out increased costs. Profits after taxes are expected to drop from last year's figure of 5% of sales to 4.6% of sales in the second half of this year.

Profits will Drop 8%

COMPARED WITH LAST HALF OF 1956

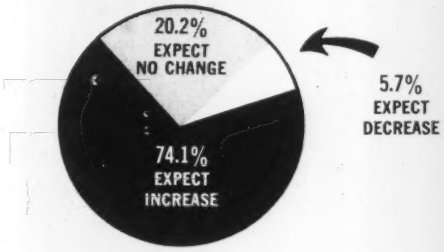

EXPECTED PROFIT ON SALES AFTER TAXES
1957 (Second Half) 4.6%
36.0% EXPECT DECREASE
30.6% EXPECT NO CHANGE
33.4% EXPECT INCREASE
PROFIT ON SALES AFTER TAXES
1956 (Second Half) 5.0%

All charts show breakdown of replies from respondents to a survey of 5,000 management executives of metalworking plants

up-trend, *problems* hold the key to *more sales* to metalworking

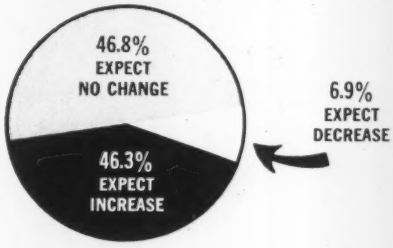
Cost-fighting products have sales appeal

MANUFACTURING COSTS UP 3.7%



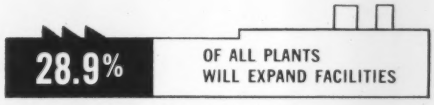
VANCE BELL, *Associate Managing Editor:* Talk costs when you're selling to metalworking and you're going to be heard. If your product can help management solve this one big problem, it ought to have real sales appeal.

SELLING PRICES UP 1.7%



JOHN S. MORGAN, *Associate Managing Editor:* Also, you'll do well to temper your selling with these additional thoughts. Price competition in metalworking itself is the toughest it has been in 10 years. Managers are extremely reluctant to pass rising material and production costs along to their customers.

CAPACITY UP 4.5%



4.4% will build new plants
13.2% will add to present plant
22.1% will install new equipment

Expansion is a "Must"

WILLIAM M. ROONEY, *Market Editor:* New plants are still going up. Very close to a third of all plants plan some second-half expansion. The market for expansion's hardware—capital goods—is being pushed along by growing population. Sellers of equipment can count on a continuing healthy market.

Where the most money's coming in

DR. ALLEN G. GRAY, *Technical Editor:* Metalworking's biggest increases in income are being enjoyed by manufacturers of electrical machinery and equipment, fabricated metal products, and instruments and scientific apparatus. Their second-half sales are expected to beat the first half-year by 7 to 9.5%. Their business is booming.

SUCH: That's an example of why it pays to know your markets thoroughly. You can sell more, sell quicker, and make sales calls more productive when you have a dependable way of picking out the prospects who have the money to buy your product and who need it.

CAMPBELL: Doing the kind of a marketing job you're talking about calls for good, basic market information.

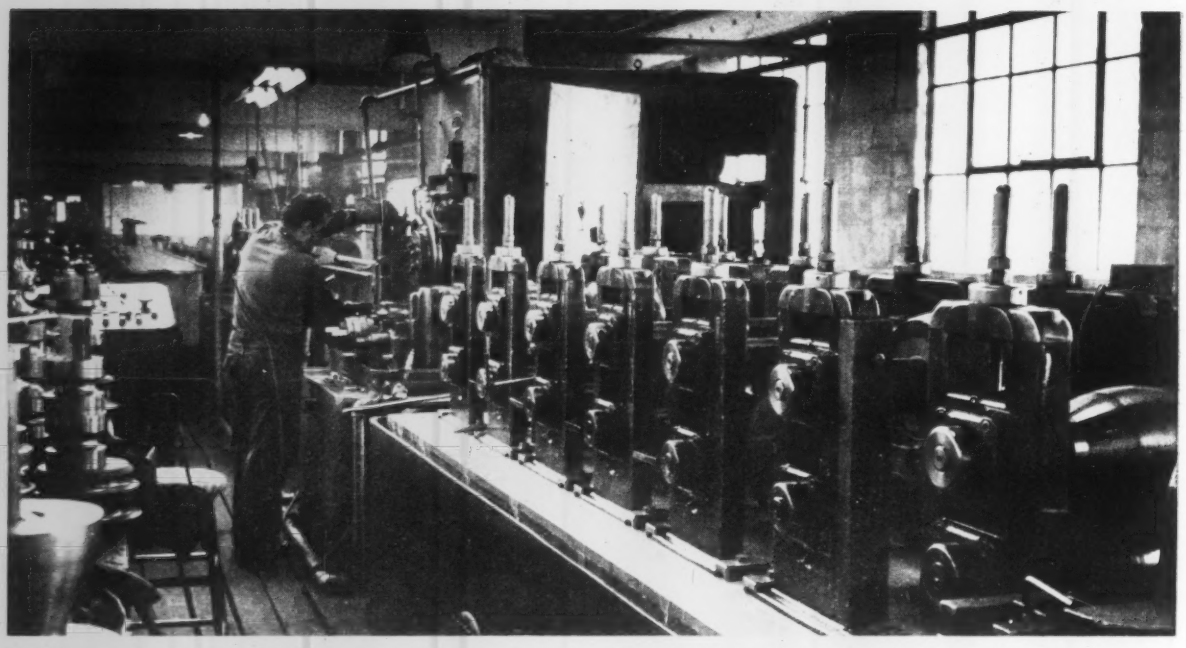
A New Guide to Metalworking Markets

SUCH: We've made STEEL's new book, "Metalworking Markets in the U.S." available to sales managers for just that reason. All the information from STEEL's census of metalworking is in it—the results of our most recent survey, S. I. C. breakdowns of market potentials—the newest and most complete metalworking marketing information you can find.

A limited number of copies of STEEL's "Metalworking Markets in the U.S." is available to sales executives. You may get a copy by contacting the nearest STEEL sales representative. Also available from STEEL: the famous metalworking marketing map, specific market information, and material from STEEL's award-winning series of problem-solving management articles.

The Metalworking Weekly

a Penton publication
penton building
cleveland 13, ohio



Sprinklers protect areas like this tube forming section, as well as hazardous acetylene generator plant and painting operation

Sprinklers Save Insurance Dollars

Fire protection system installed at a tube manufacturing plant will pay for itself in six years through reduced insurance premiums—and coverage is 40 per cent greater

"WE weren't really looking for a way to save almost $70,000 on non-operational expenses in ten years—we were looking for fire protection," says Fred R. Dresher, president of Falls Steel Tube & Mfg. Co., Newton Falls, Ohio.

Installation of a sprinkler system made it possible for the firm to qualify for a 70 per cent decrease in premium costs on consolidated insurance coverage that was increased by 40 per cent.

Dollar Savings—The average annual premium had been $4918 for $885,000 coverage on buildings and contents and $400,000 coverage for use and occupancy. Now, for $1169 a year, the company carries $1,409,000 on buildings and contents and $400,000 on use and occupancy.

At the old rate, coverage comparable to that now carried would have cost $7994 annually.

Auto Supplier—Falls Tube makes pipe for automotive exhaust and cooling systems and oil filters. Its biggest fire hazards are an acetylene generator plant, "live" acetylene piped through the plant and a paint dipping and drying operation.

Insurance coverage was so complex that company officials could not readily keep track of how risk was being handled.

In Event of Fire — Analysis showed that some buildings had no coverage; some were written as specific items; others were lumped together, and a sort of average rate was charged.

Had a major fire occurred, serious financial loss, or, at best, time-consuming negotiations would have resulted.

Sprinkler System—The fire protection system that simplified the insurance program was installed by the Automatic Sprinkler Corp. of America, Youngstown. A standard "wet pipe" system was put in the main part of the plant, and a foam system was used to protect the area sometimes used as a paint shop and drying room.

Total installation cost was $40,800. The system will pay for itself from insurance savings in six years. Since its installation, the firm has had one fire. Naphtha bags near one of its tube forming machines ignited. The fire was quickly extinguished by a nearby sprinkler.

Tapping Screw Tips

Analyzing design factors will provide easier assembly and assure a sound joint

HERE are the most important factors to consider in selecting tapping screws, say engineers at Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Kinds of Screws—Of the five common types, two are thread forming and three are thread cutting. The forming screws, Types A and B, should be used when the material is ductile enough to permit deforming. Type A is pointed and used in pierced, rather than drilled, holes where the exposed point doesn't matter.

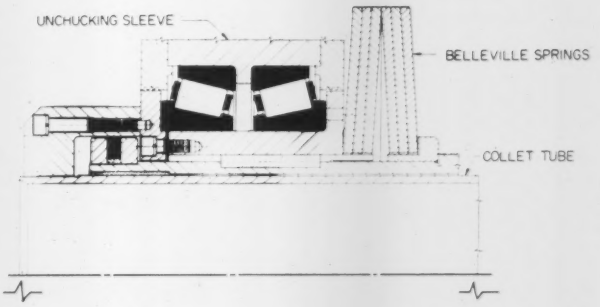
When Types A and B can't be driven because of the hardness or thickness of the material, one of the thread cutting screws, Types 1, F, 23, and 25, should be used. For hard, ductile materials, Type 1 is best; for soft, friable materials, use Type 23 or 25. Type F, which has four equally spaced longitudinal slots, drives straighter than the other types.

Load Considerations—Where load is no factor, thickness of the material determines the diameter of the screw. Use one with a thread pitch that will give at least one full thread engagement in the metal. Example: With metal 0.0625 in. thick, any screw with at least 16 threads per inch can be used.

TAPPING SCREWS
. . . the five common types

Size of the hole in the metals to be joined is important. If it's too large, the screw can't develop sufficient thread depth; it it's too small, the screw will drive hard.

Where load is a factor, select a screw with sufficient strength that provides the greatest thread engagement—four or five threads fully engaged, if possible. If the screw that is large enough to develop sufficient holding power doesn't provide sufficient thread engagement, use more and smaller screws.



This half-section drawing shows Belleville springs that supply the load for chucking. To open the collet, pressure is applied on the sleeve, compressing the springs and forcing the collet tube forward

Cost Cutter for Automatics

Problem of gripping rough, hot finished stock is whipped with a spring type chucking system. It gives you added chances to trim raw material costs

MACHINING parts from hot finished, seamless, mechanical tubing can cut your costs, but many people think that the chucking problem it presents is an offsetting disadvantage. Experts at Timken Roller Bearing Co., Canton, Ohio, disagree.

Here's what they say: "We have found there is a general misunderstanding about the use of hot finished tubing in automatic screw machines. Our Bearing Div. is the largest user of alloy mechanical tubing in the country. We machine thousands of tons each year in automatic screw machines, and nearly all of it is hot finished."

Chucking Problem — Tolerances on size are relatively loose, and the raw surface finish is not as good as that on cold finished material.

If the outside diameter is on the top limits, the machine collets or fingers may be broken by excessive holding pressures. If the tube is small, tools may be damaged if the loosely held tube slips.

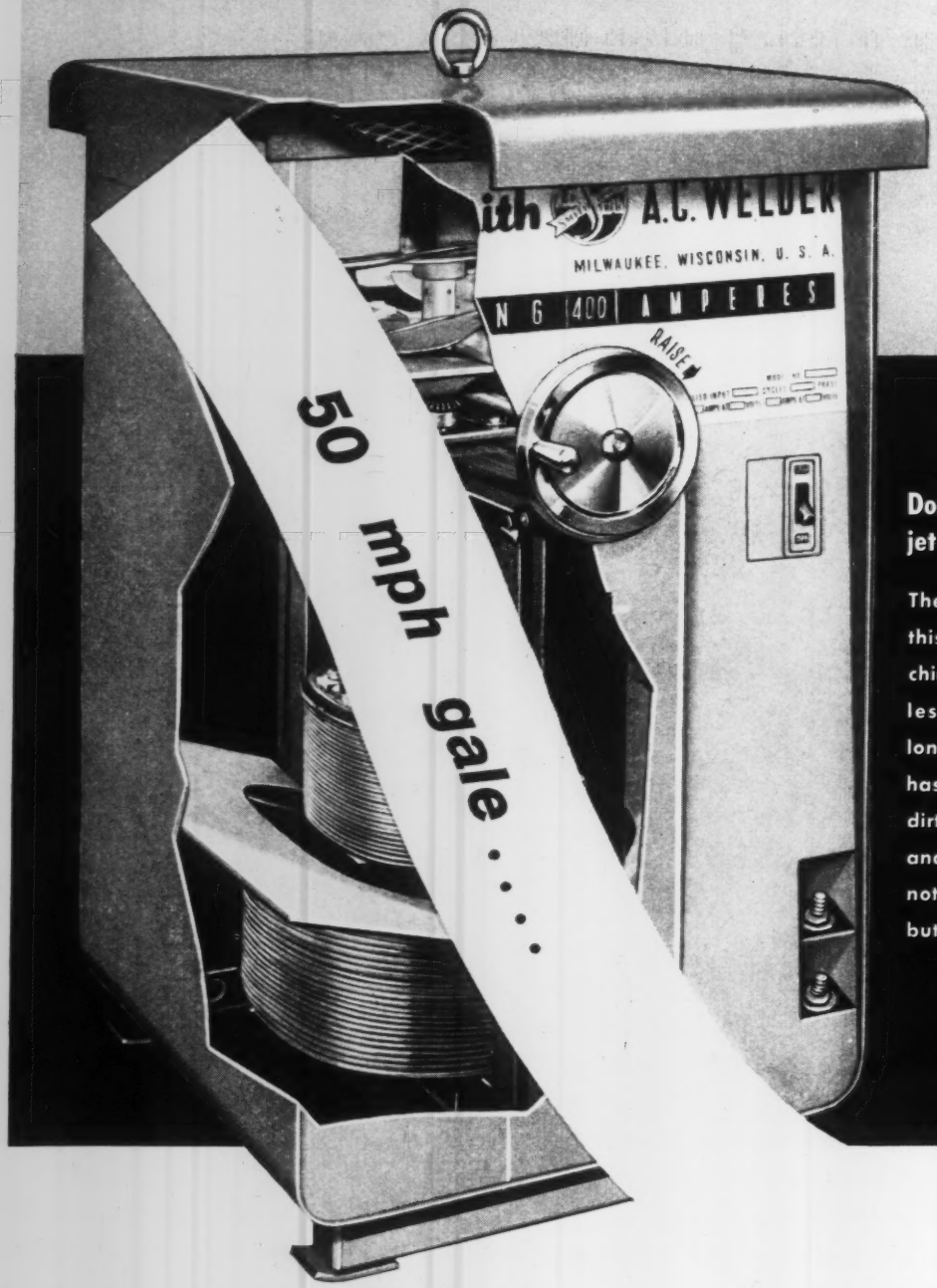
Solution—Timken has developed a chucking system for hot finished tubes. Engineers at New Britain Machine Co., National Acme Co., and Cone Automatic Machine Co. Inc. assisted.

Belleville springs give the desired chucking pressure. During unchucking, the springs are compressed, forcing the collet open to clear a maximum diameter tube.

On multiple spindle machines, conventional chucking spools and fingers are used. Preloaded Belleville springs are put between the chucking finger yoke and the collet tube to keep the load constant. Conventional feed fingers drive the stock forward when the collet opens.

Payoff — Timken engineers cite the relative costs of hot finished vs. cold finished to prove economy benefits. For every dollar you spend on hot finished stock, they say, you'll spend in the neighborhood of $1.05 to $1.20 on cold finished, depending on steel grade and tube size.

If you buy a welding machine without all these features . . . . . You're



Does it have jet-stream ventilation?

The ultimate advantage of this feature is that the machine will run cooler, need less maintenance, last longer. High-velocity air has a scouring effect, keeps dirt from collecting on coils and stacks. Remember, dirt not only impairs efficiency but also retains heat.

asking for trouble!

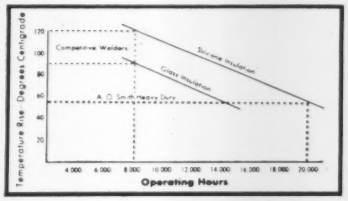
Only machines offering *all* these advantages can truly provide lasting, highly satisfactory, trouble-free service. Only A. O. Smith machines can answer the challenge!

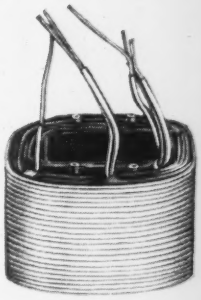
Only A. O. Smith offers you the welding machines of tomorrow — today. Every machine in the line offers the features illustrated. And these and other A. O. Smith features add up to longer life, fewer production stoppages due to breakdowns, less cost for maintenance and service.

Further, A. O. Smith offers a complete line — in most cases several choices in each size. That means you can choose a machine tailored exactly to your present and future needs.

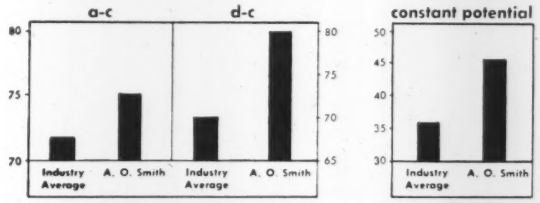
Look these features over carefully. Then see if the next welding machine salesman that calls can match them. He can't! Only the man from A. O. Smith can! Check him before you buy!

Does it have silicone insulation? All A. O. Smith machines do. Silicone (Class H insulation) is the newest, most expensive insulation known to the electrical industry. Despite higher costs, A. O. Smith is the *only* machine manufacturer using silicone "right-across-the-board" on *all* models. Silicone permits higher operating temperatures under peak load conditions and absolutely prevents coil damage due to moisture accumulation. Longer life is assured.

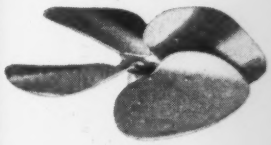




Does it offer doubly protected coils? On A. O. Smith units, coils are not only vacuum-impregnated, they're also precision wound. Result: They're resistant to moisture and there's no possibility of chafing each time an arc is struck. This double protection results in stepped-up efficiency—for years on end.



Does it have bonus open-circuit volts? The charts above provide an idea of why all A. O. Smith machines "go beyond the call of duty"... provide bonus open-circuit volts for more force, more drive and greater arc stability. It's this bonus margin that makes A. O. Smith welders and rectifiers the machines of the future.



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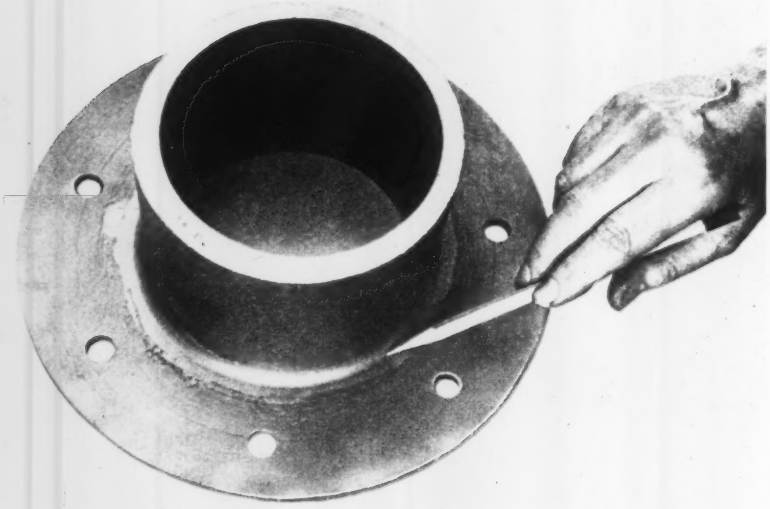
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
A. O. Smith International S. A., Milwaukee 1, Wisconsin, U. S. A.

Here are the rules for shielded metal arc welding with a consumable (coated) electrode. One of a series, this article covers material selection, preheating, joint design, and technique



Source: Copper & Brass Research Association, New York

You can use shielded metallic arc welding to join copper with dissimilar metals. Aluminum bronze bearing (above) is welded to a mild steel flange with ECuAl-A electrodes

How To Weld Copper and Its Alloys

PART TWO

By LESTER F. SPENCER
Metallurgist,
West Allis, Wis.

MOST of the copper-base alloys can be arc welded. Although they have a considerable range in composition, only a few variations of standard procedures and electrodes are needed.

Coated electrodes similar to the base metal are normally used in shielded metallic arc welding. Exceptions: The copper-zinc alloys (brasses). In such cases, the electrode material is a phosphor bronze, an aluminum bronze, or a silicon bronze. The choice depends upon the analysis of the brass alloy and service for which it is intended.

Bare electrodes are used to some extent, particularly with copper, copper-tin, and copper-silicon alloys. Direct current, reversed (positive) polarity is commonly used. Some electrodes are available for alternating current.

Needs Preheat—The copper-base alloys require preheating. Here is a good general rule: Use 400° F for the bronze alloys (don't exceed 150° F for silicon bronze), 500 to 600° F for the brasses, 700° F for beryllium copper, and 800° F for copper.

Don't overlook the factors of joint design, cleaning prior to welding, and backing bars (Part I, STEEL, Jan. 27, p. 86). Backing bars are generally of the same composition as the base metal, but copper and carbon strips can also be used with most alloys. A grooved backing strip is effective in forming small heads on the underside of the plate.

Peening is often used after welding has been completed. It reduces stresses within the joint and im-

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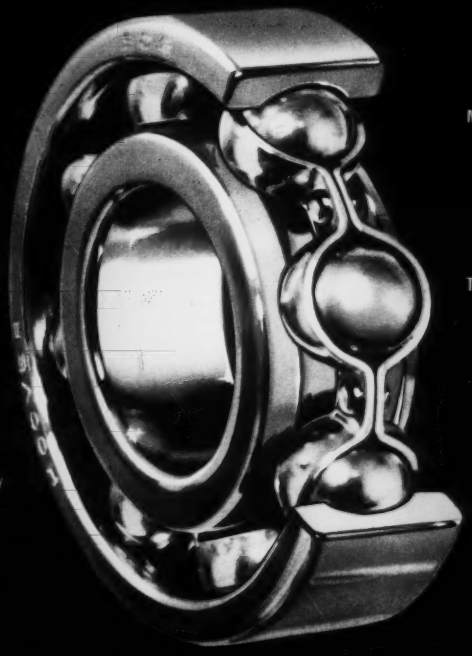

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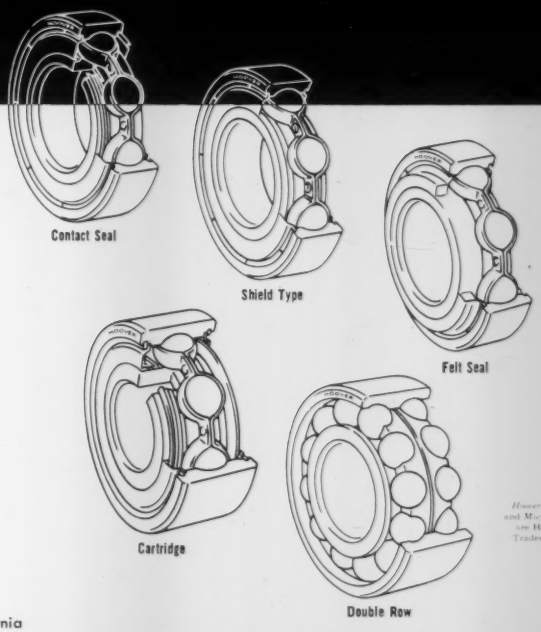

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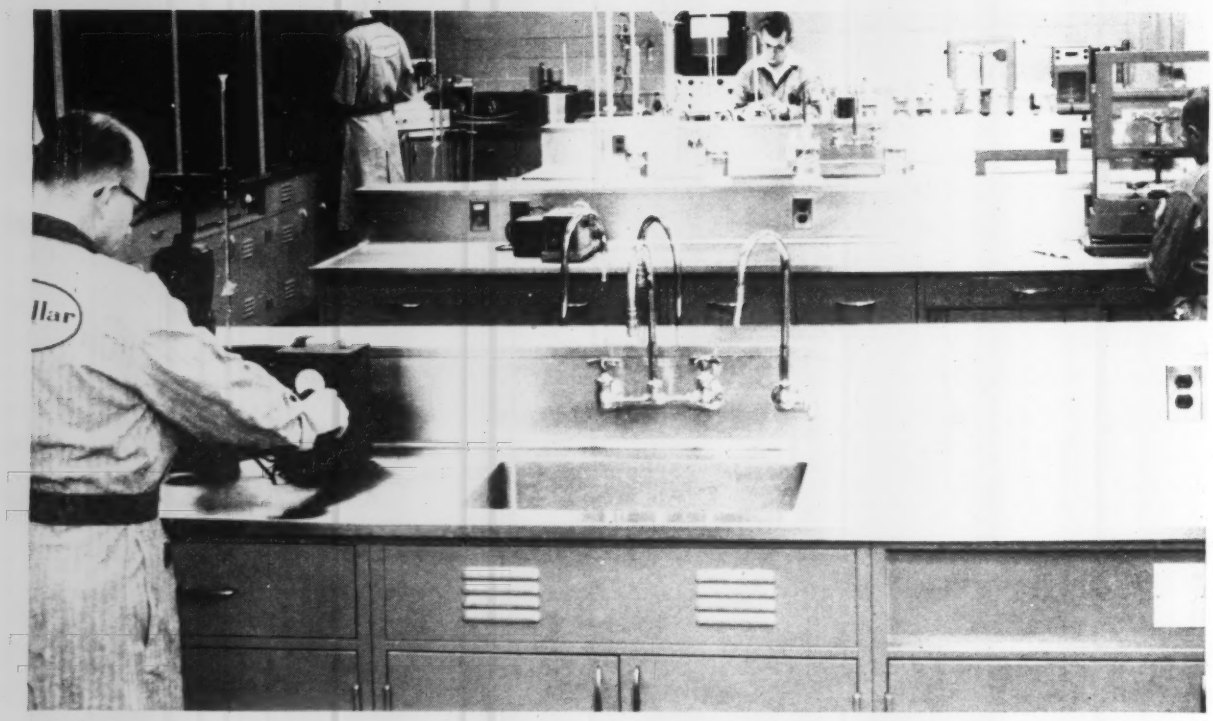

Competitive "Acid Test" Selects Carpenter Stainless No. 20Cb

To find out which grade of stainless steel would hold up best under attack by highly corrosive acids, a large manufacturer put his laboratory to work. The best performer was then selected as the steel to be used in table tops and sinks throughout his new materials testing laboratories shown above.

Carpenter Stainless No. 20Cb showed less weight loss than any other steel when subjected to mixtures of hydrochloric and sulphuric acids. Attack of the sulphuric acid was so slight that the spots easily wiped off. This super corrosion-resistant steel will withstand a wide range of laboratory acids in many concentrations and under varying temperatures.

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MEMBER

Shearing and buffing Stainless No. 20Cb sheet used for laboratory table tops and sinks.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

Stainless No. 20 & No. 20Cb

proves the mechanical properties of the joint. Watch for localized failure. Flat-nosed tools are recommended. Use a lot of hammer impacts of moderate intensity.

Selection of Type — Fabrication ease and exceptionally high thermal and electrical conductivity have made electrolytic, tough pitch copper an excellent engineering material, but it is not preferred for extensive welding, because of a dispersed cuprous oxide phase, which causes embrittlement at the fusion zone and a loss of strength about one-third that of the base metal. Deoxidized copper is recommended for applications requiring extensive welding.

The deoxidized copper electrode (ECu) is used when high thermal or electrical conductivity or corrosion resistance is of primary importance. When service requirements permit, high strength joints can be obtained with phosphor - bronze (ECuSn) or a silicon-bronze electrode (ECuSiA, RCuSiB). Such rods have high fluidity that permits rapid welding. Rod manipulation can also be done at lower preheat and interpass temperatures.

Deoxidized copper can be multipass welded if high interpass temperatures are used. It permits the joining of all thicknesses.

Except for two requirements (faster welding speeds and lower preheat temperatures), oxygen-free copper welding is similar to that for deoxidized copper. Welding is restricted to the single-pass technique.

Preheating Requirements — The high heat losses through copper plate necessitate preheating to obtain satisfactory bonding. The rate of heat input depends on electrode size—and it depends on the filler metal requirements.

The correlation of preheat temperatures and electrode size is given in the table at right. Preheating should be carefully controlled. It can have an adverse influence on metallurgical changes in the base metal.

Don't Overheat — Temperature should be held to the minimum consistent with the production of good welds. Preheating will retard the cooling rate of the weld metal. If phosphor or silicon bronze filler metal is used, failures due to hot shortness may develop. Preheating also reduces the number of microfissures in copper welds.

You can reduce preheat temperatures by using as large an electrode as you can. Resulting high currents increase fluidity, which minimizes undercutting and slag inclusions. Too large an electrode causes excessive shrinkage of large craters. Added to the contraction of the preheated base metal, areas of high stress are left in the workpiece.

Remedies—Such difficulties may be eliminated by single V-groove welding in the vertical or near vertical position with electrodes of medium diameter. The smaller weld pool minimizes contraction stresses. A completely filled groove establishes a weld cross section more capable of withstanding contraction stresses, and it avoids the reheating of previous deposits.

In the vertical position, slag may be removed from the shelf or shoulder by electrode manipulation. Completing the weld as a single layer preserves the preheat around the weld. Any auxiliary heat is under better control since it may be applied continuously from the reverse side of a joint setup with a copper backup strip.

Other Applications—The metallic arc process works well in joining copper to low carbon steels. Examples: Tacking steel rings to copper shells at Van Stone joints; welding steel saddles to a copper shell in the reinforcement of connection openings. Coated nickel-copper electrodes are most successful.

Brasses—The addition of zinc to copper facilitates welding by reducing thermal conductivity and the melting point. While there are a great number of modified alloys for special applications, welding selections are usually confined to a few like Muntz metal, naval brass, manganese bronze, red brass, and commercial bronze. In general, leaded alloys should be avoided. Lead affects weld quality and the properties of the base metal at elevated temperatures.

Aluminum bronze and phosphor bronze electrodes are preferred for the welding of brass. The aluminum bronze rods (ECuAl-A1, ECuAl-A2, and ECuA1-B) are used for high strength, high fatigue, and corrosion resistance. Phosphor bronze electrodes (ECuSn) are used for the lower zinc alloys when maximum tensile strength requirements are 40,000 psi.

Preheat Requirements — Most operators feel that some are necessary. Temperature depends on thermal conductivity, the mass of base metal involved, plus the current carrying capacity and size of the electrode.

The low zinc alloys require preheat and interpass temperatures between 400 and 500° F. Alloys with a high zinc content require a higher preheat (500 to 700° F).

Other Recommendations — Flat position welding is best. Zinc tends to volatilize, so welding time should be held to a minimum by using the largest diameter rod conforming to the application. Welding is done with direct current reversed polarity on the high side of the range.

You can hold zinc volatilization to a minimum by concentrating the heat of the arc. A small puddle of

Preheat of Single V, ¼-½ In. Copper Joints

ELECTRODE SIZE, In.	ARC VOLTS	ARC AMPERES	PREHEAT (°F)
3/16	30 to 35	200 to 220	1200 to 1400
1/4	30 to 40	240 to 280	1100 to 1300
3/8	30 to 40	350 to 400	900 to 1100
1/2	30 to 40	400 to 500	800 to 1000

When you buy from U. S. Steel

STEEL + PLUS IN ACTION: RESEARCH

A fast train is a safe train when it rides on high-quality USS Wrought Steel Wheels. To test wheels, U. S. Steel's Research Center at Monroeville, Pa., operates the world's largest inertia dynamometer. It operates at speeds equivalent to 160 mph, can generate 68½ *million* foot pounds of energy—enough to lift a 34,000-ton ocean liner a foot in the air. The tests indicate how changes in design, steel composition and heat treatment can further improve the quality and safety of USS Wrought Steel Wheels.

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STEEL + PLUS IN ACTION: TECHNICAL ASSISTANCE

The Cemline Corporation makes a complete line of tanks, ranging from one gallon to 6,000 gallons —including the 15-gallon expansion tank and the 3,000-gallon steam-or-electric coil-heated water storage tank shown here. For Cemline's expansion tanks used in public buildings, USS metallurgists suggested a special quality steel which enabled them to meet a new and exacting safety code, yet produce the tanks economically.

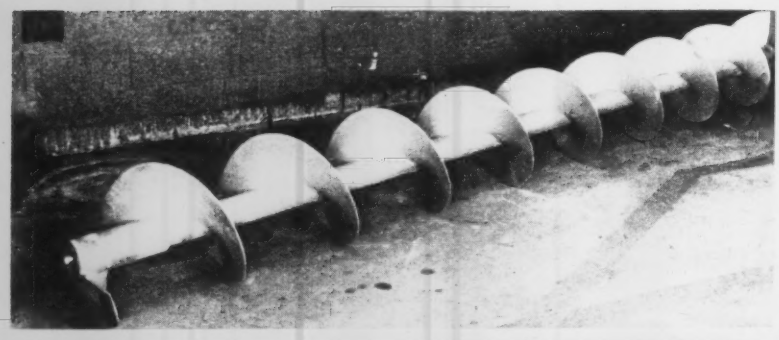
STEEL + PLUS IN ACTION: FACILITIES

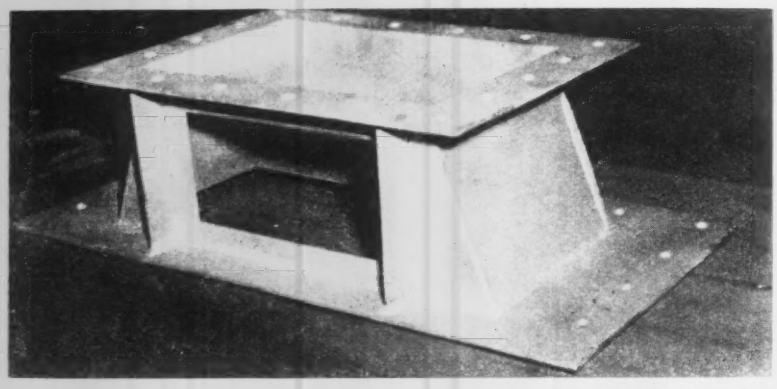
Only United States Steel can supply pipe like this. It's called expanded seamless line pipe. The pipe is pierced from a solid billet of steel and hot-worked to size. Then, it is *cold expanded,* and this cold-working process results in improved welding properties, plus higher yield strength (at least 10% higher). The National Tube Division of United States Steel developed this new pipe, and it is available in diameters from 16 to 26 inches, in a full range of wall thicknesses.

STEEL + PLUS IN ACTION: MARKETING ASSISTANCE

United States Steel maintains a staff of market development specialists who work with customers, and *customers'* customers, to make the most effective use of products made from steel. The picture shows a member of our marketing team in action. L. to r.: Walter Nelson, Vice President, General Bronze Corp.; Charles LeCraw, USS Construction Specialist; John Starrett, Perkins & Will, Architects. They are working out details for a new, all-steel curtain wall building.

USS **United States Steel**





Source: Copper & Brass Research Association, New York

Here are two examples of shielded metallic arc fabrication. Screw conveyor (top) and manhole inlet (bottom) are made of aluminum bronze

WELD COPPER . . .

weld metal is started at one point; the arc is played on the deposit and progressed slowly to secure a braze welding action. When possible, a weaving motion should be used. The width of the weave should be about three times the electrode diameter with a pause at the side walls to fill in undercuts.

Modification — If you are using phosphor bronze electrodes, preheat temperatures for copper-zinc alloy are usually lower than those for welding with aluminum bronze rods. Amperage is on the high side of the recommended range. The weld is deposited with fast, thin stringer beads.

Ordinarily, no postheat treatment is necessary. Standard backing strips are used, regardless of electrode type. Wide grooves are essential to proper penetration and avoidance of slag inclusions.

Coated electrodes (silicon or aluminum bronze) are available for metallic arc welding of silicon bronze. Weld properties are slightly lower than those of carbon arc or oxyacetylene methods. The method is used with varying success.

Silicon Bronzes — The relatively low thermal conductivity of such alloys helps the welder. However, the silicon bronzes are hot short: Avoid overheating the joint. Preheating is not recommended, and with interpass heating the temperature should not exceed 150° F.

Here are some recommended practices: 1. Weld rapidly, depositing beads as stringers. 2. Use current values in the middle range with an electrode chosen for use with a short arc. 3. Maintain a small weld puddle to avoid overheating. 4. Use moderate peening with flat-nosed tools. 5. Eliminate postheat treatment. Downhand welding is preferred although vertical and overhead position welding can be used.

Phosphor Bronzes—These alloys show a tendency to become hot short. They are also inclined to interdendritic shrinkage of the low melting constituent, so rapid deposition of weld metal is necessary.

Although the metallic arc process is widely used, inert gas, metal arc welding is rapidly becoming more popular. Bare and coated phosphor-bronze electrodes are used —the coated types are preferred because they are easier to manipulate and deposits have better mechanical properties. Most electrodes are designed for direct current reversed polarity; alternating current electrodes are available.

Preheat and interpass temperatures should be between 300 and 400° F to aid deposition of a smooth bead and refine the structure that occurs in multipass welding. A string bead technique with peening will eliminate grain coarseness and produce a high strength, ductile weld. For maximum ductility, use a postheat of about 900° F followed by rapid cooling.

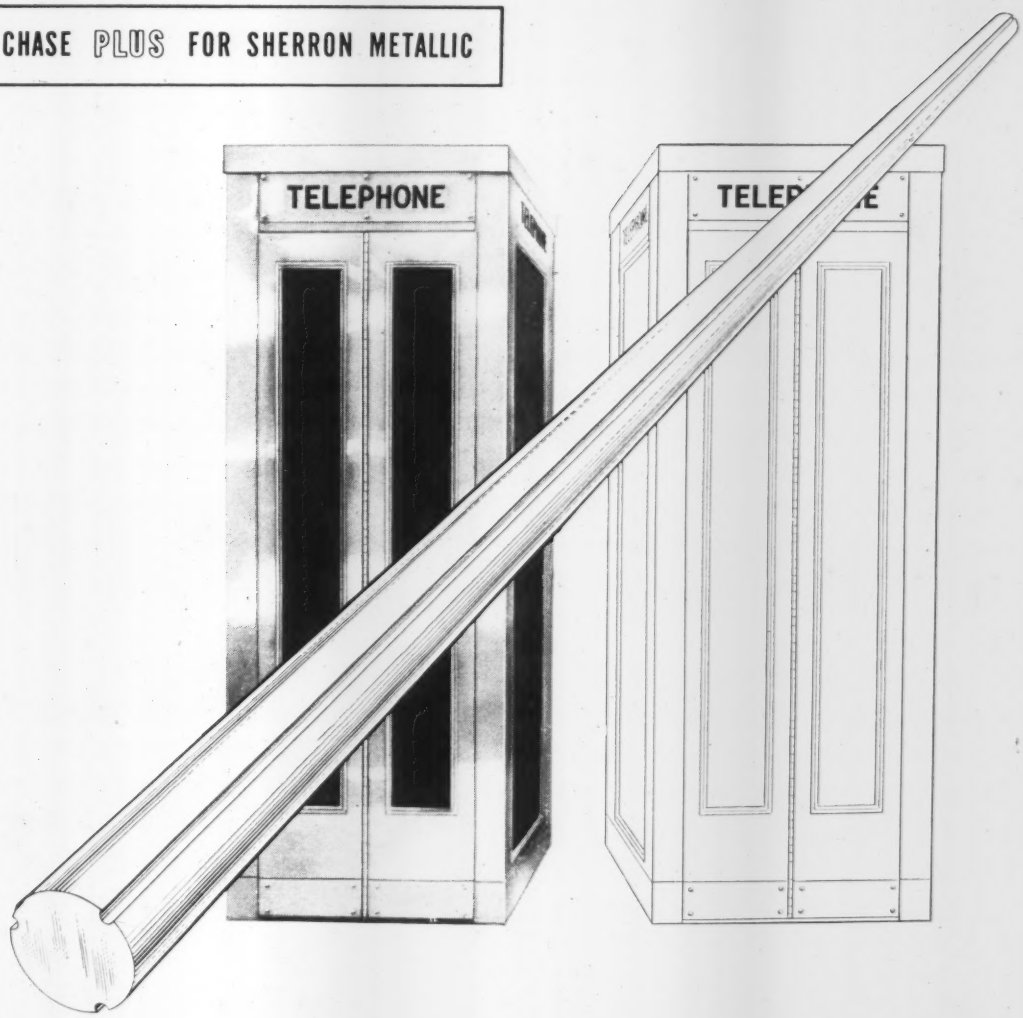
Operators should also: 1. Use wide grooves in the joint design. 2. Use backing plates. 3. Use current values in the middle of the recommended range. 4. Use the short arc technique. 5. Use flat position welding when possible. (Most electrodes can be used in the vertical and overhead position if necessary.) 6. Use a weave for the first two passes in multipass welding. The width should be about twice the electrode diameter. Make the rest of the layers with fast, thin stringer beads.

Aluminum Bronze—These materials have always been difficult to weld due to the highly refractory oxides formed by heat. Flux coated electrodes with compositions similar to the base metal (ECuAl series) have been developed. Electrode Type ECuAl-A2, with a nominal 10 per cent aluminum content, is used to weld wrought products; an electrode type with a higher aluminum content (ECuAl-B) is used for overlaying die and bearing surfaces which require higher hardnesses. Electrodes can be operated on direct current (reversed polarity) and alternating current.

It's best to use standard joint designs. The 60-degree groove is used for heavier sections. Backing strips are recommended, and the welding current should be in the middle of the specified range.

Preheat and interpass temperatures are frequently employed, although they vary with alloy type. The lower aluminum alloys require 400° F; the higher ones containing bronzes require between 700 and 800° F to avoid deposit cracking. Postheat treatment is not required for the bronzes which contain little

THE CHASE PLUS FOR SHERRON METALLIC



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WELD COPPER . . .

aluminum. The high aluminum grades require an anneal at 1150° F, followed by rapid air cooling.

Weld Properties—Since aluminum bronze weld deposits have good hot ductility and strength, bead thickness has little effect on mechanical properties. Weave or string beads can be deposited with equal success. Deposits do not have the tendency to develop a coarse grain structure, as with phosphor bronze electrodes. Downhand welding is preferred.

Preferred Method — The coated electrodes (AWS-ASTM Type ECu-Ni) make the shielded metallic arc welding the best procedure. The coating fluxes the highly refractory nickel oxides, producing high quality welds. Electrodes operate best on direct current, reversed polarity. Use the middle of the recommended current range. Welding should be done in the flat position. Since aluminum bronze alloys are hot short, keep preheat or interpass temperatures under 150° F.

Standard joint design is used in multipass welding. The 60-degree groove angle is also recommended. Be sure to remove slag from deposited metal prior to laying the next bead. Use the stringer bead technique since it deposits thin layers rapidly and avoids overheating. Moderate peening improves the mechanical properties of the joint and reduces stress concentrations.

Beryllium coated electrodes, similar to the base metal (1.1 per cent nickel and 2.5 per cent beryllium) are required in the welding of beryllium copper. The aluminum-bronze electrodes can be used for repair welding when electrical conductivity is not a deciding factor.

A preheat of 600 to 700° F is required to obtain a smooth weld deposit and to avoid undercutting. The behavior of deposited filler metal is erratic, and a somewhat longer arc is required to avoid freezing the electrode. Work positioning is recommended so that all welding can be done in the downhand position. The weld metal can be deposited in string beads or weave beads that are three or four times the electrode diameter.

• *An extra copy of this five-part article is available until supply is exhausted. Part I appeared Jan. 27. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Vacuumized Sweeper Speedily Cleans Large Areas

Model 100's chief feature is its powerful vacuum. Dust laden air is forced through a 540 sq ft dust filter system and removes particles as fine as 5 microns.

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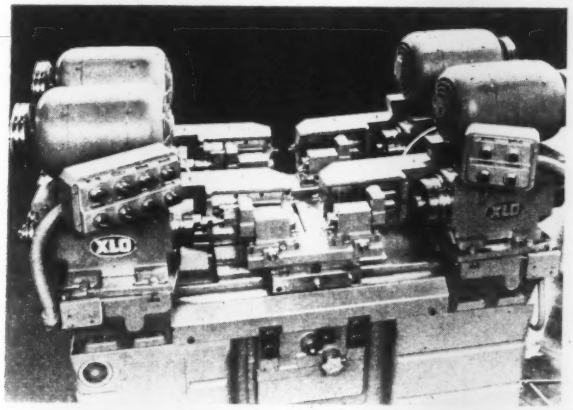
A main broom and two gutter brooms rotate inside the vacuum equipped housings of the sweeper. Heavy dirt and debris are swept up by the brooms and discharged into a hydraulically dumped dirt hopper.

Lighter dirt is removed by a special dust separation mechanism, making salvage an easy matter.

The sweeper travels at a top speed of 15 mph and has a 7 ft 4 in. path. It is available with power steering, power brakes, and a cab. *Write*: G. H. Tennant Co., 721 N. Lilac Dr., Minneapolis 22, Minn. *Phone*: Liberty 5-3771

Boring Machine Taper Turns Valve Keys



Style 1212-B, double end, precision boring machine utilizes a four-station tooling setup for taper turning petcock valve keys. The keys are between tailstock and spindle centers at all stations. Spindle chucks grasp handles or ends of the parts and act as drivers. Turning takes place first at the lefthand stations. The tools then retract rapidly and the cross slide advances to the opposite end for machining.

One end is loaded or unloaded while the machine cycle goes on at the other.

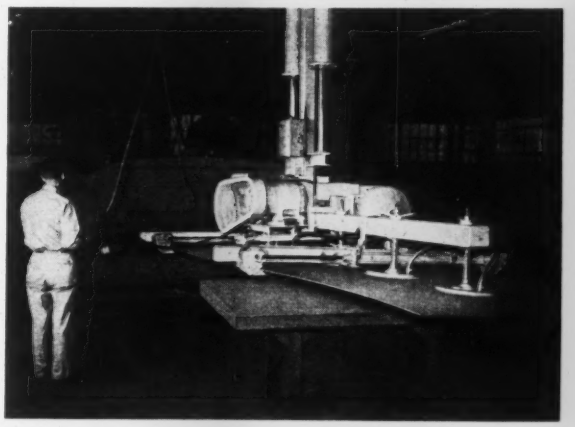
Angular spindle mounts provide a 16-degree adjustment required either side of the spindle centerlines. Gage blocks furnished set the angle required. Tool blocks and drive details are interchangeable. *Write*: Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. *Phone*: Townsend 8-3900

Sheet Handler Attaches Quickly to Crane

This sheet handler is designed for attachment to cab or floor operated overhead cranes. After the installation of a permanent saddle on the crane trolley, the plate handler can be attached or removed in a few minutes. The big advantage here is that the crane is freed for other work.

The operator lowers the vacuum cups to the plate and pushes the hoist button to raise the plate. An air-powered, mechanical safety device automatically slides into place as it is raised. Stiff leg support columns steady the load to keep it from swinging or swaying.

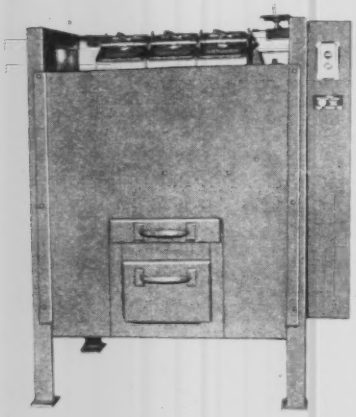
Plates can be picked from the floor, off a pile, or set down, without blocking. Standard lift capacities range from 1000 to 4000 lb. *Write*: Noble Co., Box 1979, Oakland 4, Calif. *Phone*: Templebar 2-5785



NEW PRODUCTS and equipment

Finishing Unit

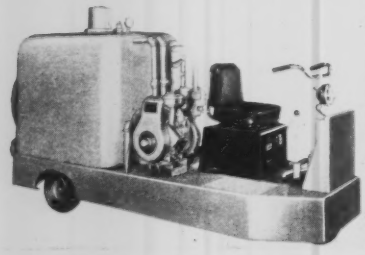
Model DLX is made for tumbling, deburring, and polishing. The 2.2 cu ft machine has two or three compartments and a 12 to 36 rpm variable speed drive. It provides a built-in reciprocating screen separator, a drainage outlet, and a 1-cu ft hopper pan for fast handling of work.



Other features are a direct chain and sprocket drive, remote controlled starter, and vinyl-lined barrels. It has a ½-hp motor, welded steel plate construction, and measures 40 by 42 by 49 in. over-all. *Write*: Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio. *Phone*: Mulberry 1-2800

Sludge-Vac

This machine collects sludge chips and waste oil from tool sumps and settling tanks, transports it to the disposal area, and discharges it under pressure. It is 42 in. wide, 9½ ft long, is driven by a 14.7 hp, two cylinder, air cooled engine. The vacuum generator can be driven by a 7½-hp gasoline engine or a 5-hp electric motor. Heavy sludge can be lifted from pits 10 to 15 ft deep and discharged 50 ft. A neoprene hose 25 ft long and 1½ in. in diameter is coiled at the rear of the machine. *Write*: Gorske Industrial Equipment, 132 E. 30th St., Indianapolis, Ind. *Phone*: Walnut 4-1000



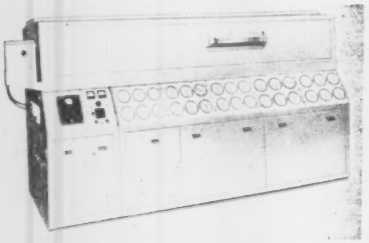
Pneumatic Feed Turretable

This air-powered indexing table remains locked when not indexing. It will index to 4, 6, or 12 stations, has a smooth stroke, and will work at pressures as low as 40 psi. The

index speed at 12 stations is over 3100 an hour. It weighs 175 pounds and has a 14 in. diameter turntable. *Write*: Dept. TT-P49, Mead Specialties Co., 4114 N. Knox Ave., Chicago 41, Ill. *Phone*: Mulberry 5-6800

Spectrometer

The Atomcounter, a direct reading spectrometer, performs and registers the analysis of ferrous and nonferrous metals and alloys within 30 seconds. Designed for production analysis, it can handle up to



30 elements. Features include fingertip control, safety interlocked circuits, plug-in components, and temperature stability. *Write*: Jarrell-Ash Co., 26 Farwell St., Newtonville 60, Mass.

Electrolytic Grinder

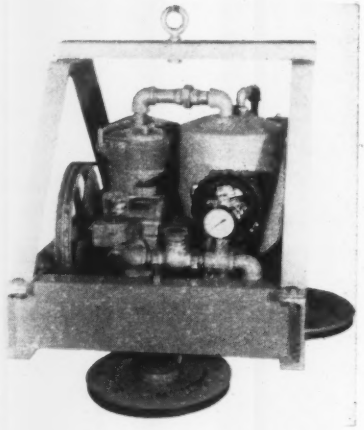
No. 618 has an Anocut 300-ampere power supply, and a 1½-hp motor. The electric unit is fan cooled and the brushes are enclosed. A 20 to 1 potentiometer-controlled drive gives table speeds from ½ to 11 ipm. The emergency stop can

be automatically or manually operated. A flow coolant system complete with filter keeps the electrolytic solution clean.

This machine converts from electrolytic to standard grinding in a few seconds. *Write*: Reid Bros. Co. Inc., Beverly, Mass. *Phone*: Walker 2-0811

Portable Vacuum Lift

This lift moves flat materials (glass, sheet metal, marble slabs, plasterboard, and plywood) swiftly and safely. Designed for overhead crane use, it will handle a standard

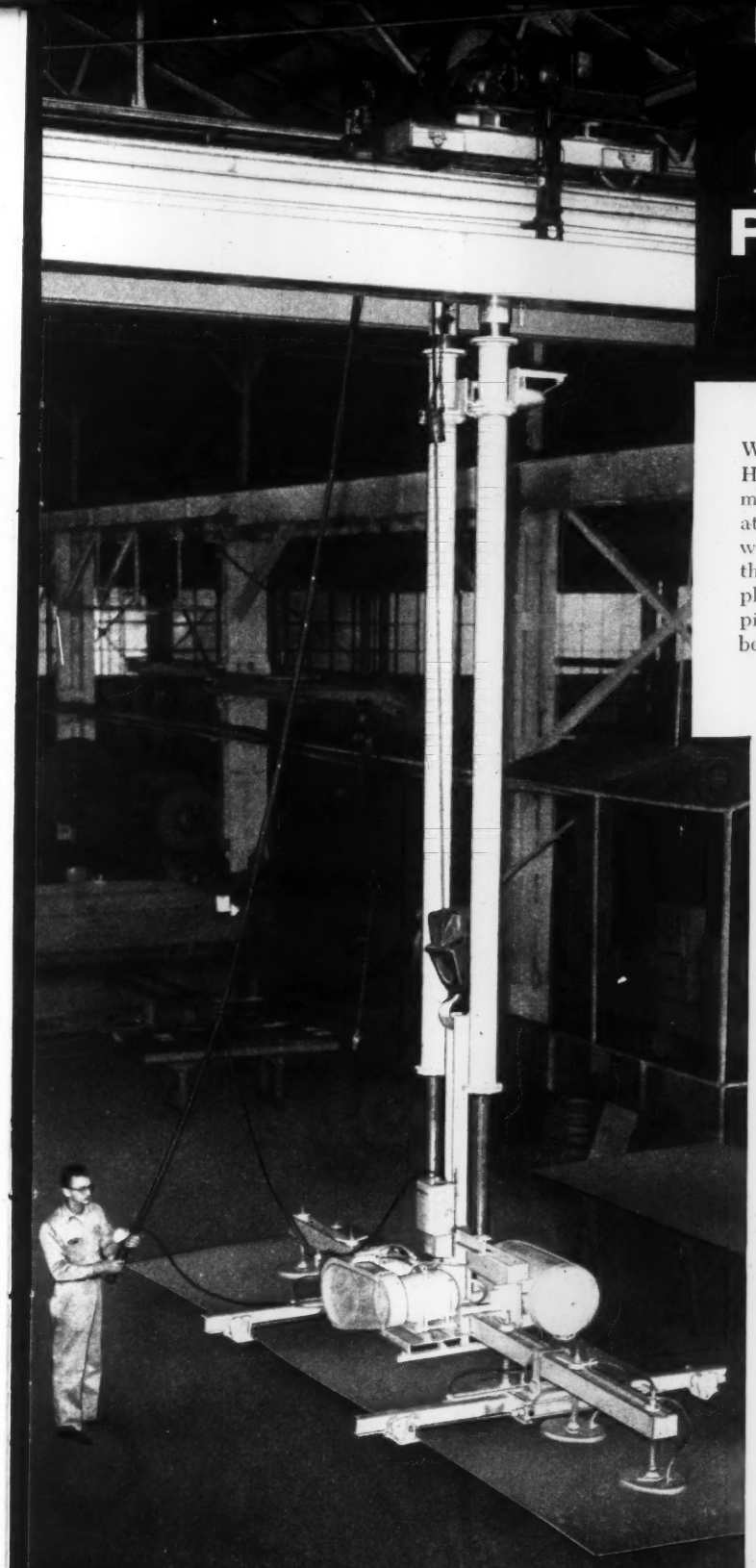


setup of four vacuum pads 12 in. in diameter, and will lift 4420 lb at 25 in. mercury vacuum.

Safety features include a vacuum reservoir and a built-in warning light. The vacuum pump is of curved vane design. *Write*: Edward Zibell Co., Montvale, N. J.

Vertically Opposed Unit

You can deburr, spot-face, drill, tap, ream, or perform other operations with this automatic machine (individually, simultaneously, or in



NOW—

One-Man Plate Handling

WITH YOUR OWN CRANE!

With a NOBLE Pushbutton Plate Handler on your crane, there's no more need for prying up plate to attach slings or grabs... no more wrestling a swaying load through the shop... no more manhandling plate into place on feed tables or piles. One man does the job faster, better, with greater safety.

Here's why:

1. *Automatic* PICK-UP... *NOBLE vacuum lift system picks up sheet or plate on contact with surface; no blocking needed.*

2. *Automatic* MECHANICAL GRABS... *grip plate as soon as lifting begins, provide positive mechanical grip for safe carrying even if power fails.*

3. NO SWING & SWAY... *"stiff leg" crane attachment keeps load under control. One man can guide it safely through shop, spot it accurately on machine feed table or pile—faster!*

NOBLE Pushbutton Handlers are easily installed on cab or floor-operated overhead cranes. Permanent mounting saddle on crane trolley permits attachment or removal of entire handler assembly in 3 minutes, so there's no interference with normal crane use.

Standard lift capacities are 1000, 2000, 3000 and 4000 lbs., larger capacities available on order. Vacuum lift system will handle any type of ferrous or non-ferrous metals or plastics, won't mar finishes or coatings.

Every working hour, every working day, "muscle power" handling methods are eating up profits, slowing production. Want proof?—Check your own shop *now*. Then get the facts on NOBLE Pushbutton handlers—write or wire for complete data. Please address Dep't. S-2.

NOBLE also manufactures complete automatic plate handling systems; brochure on request.

6

NOBLE COMPANY

P.O. BOX 1979 • OAKLAND 4, CALIFORNIA

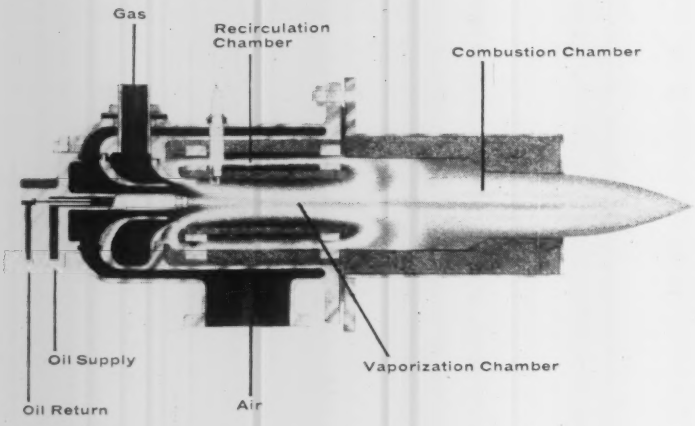
U. S. and Foreign Patents Pending

THERMAL'S

COMBINATION

GAS-OIL BURNERS

the flame is the same . . .
with **OIL** *or* **GAS**



This versatile burner retains its high velocity combustion characteristics whether the fuel used is distillate oil or gas. The flame is short and non-luminous with an exit velocity of between 300 and 500 ft/sec. On either fuel, 85% of combustion takes place within the burner itself and the flame length seldom exceeds 1 ft. Switching fuels is simple and the burner need not be shut off during the changeover.

THERMAL combination burners provide high convection heat transfer for furnaces, dryers and air heaters and tempering air can be added without creating soot or smoke. Special applications include ladle heating, submerged combustion, skelp furnaces and packaged high capacity steam generators.

WRITE FOR BULLETIN #109

OTHER THERMAL PRODUCTS & SERVICES

Gas & Oil Burners • Heat Exchangers • Submerged Combustion • Air Heaters • Gas Generators • Combustion and Heat Transfer Engineering.

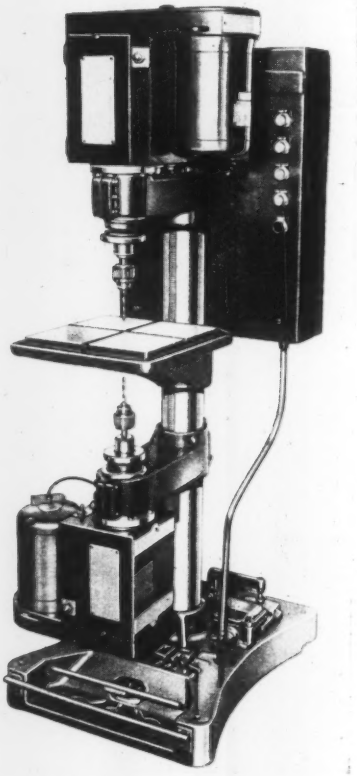
THERMAL

Thermal Research & Engineering Corp.

CONSHOHOCKEN • PENNSYLVANIA

REPRESENTATIVES IN PRINCIPAL CITIES

NEW PRODUCTS and equipment



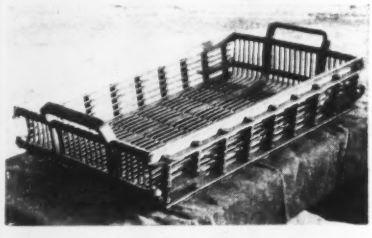
sequence). It uses small index tables, air clamp fixtures, hopper or vibration feed.

The unit has two Dumore Series 24, automatic drill units with a capacity of ⅜ in., and will tap ½ to 13 in. in mild steel at speeds of 400 to 7420 rpm.

It is available with all operational and safety controls built in. *Write*: R. E. Ellis Engineering Co., 5001 W. Fullerton Ave., Chicago 39, Ill. *Phone*: National 2-1862

Heat Treat Basket

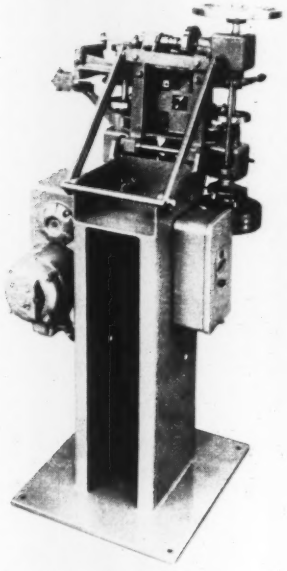
Unique design in this heat treat basket eliminates the common stress points. It combines longitudinal strength and lateral support with-



out welding. Increased capacity is obtained because of the outstanding strength to weight ratio. *Write*: Bix Co., Fairgrounds Road, Wellington, Ohio. *Phone*: 510

Wire Formers

Model 00 Automatic four-slide wire formers include a "flip top" vertical swing bed for tooling, adjustment, and maintenance. When in operation, the horizontal position



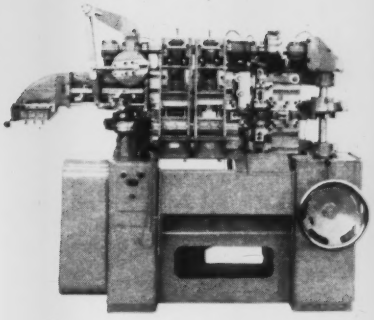
is used. Increased feed length of 4¼ in. allows this machine to produce small precision parts now being made by costlier methods. *Write*: Baird Machine Co., Stratford, Conn. *Phone*: Edison 7-3361

Gear Honing Machine

Model GHC removes nicks and burrs, improves tooth surface finish, and makes minor tooth shape corrections in hardened gears. Taper and crown honing can be performed.

A special high speed workhead permits honing with constant pressure or zero backlash methods. It hones gears from 4 to 6 in. pitch diameter, has a 2-hp motor, and a ½-hp hone head reciprocating motor. The machine occupies a space of 63 by 40 in. and is 64 in. high. *Write*:

THE FIRST ENTIRELY NEW FOUR-SLIDE IN FIFTY YEARS!

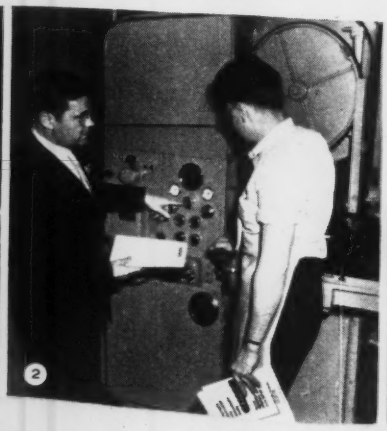


A development of industry-wide importance is the Torrington Verti-Slide—a new vertical 4-slide that is the first major innovation in the basic field of wire and strip forming equipment in half a century!

The Verti-Slide was designed to meet a serious need for greater versatility, lower tooling cost, faster set-up time and reduced floor space. We urge you to investigate the new Torrington Verti-Slide in detail.

THE TORRINGTON MANUFACTURING COMPANY

TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO



How DoALL's "Continuous SERVICE" insures profitable operation with DoAll Machine Tools

7-point program of interest to all plant executives

To keep your DoALL machines producing at the highest possible profit, The DoALL Company offers a 7-point User-Help Program—far beyond any other service in the industry.

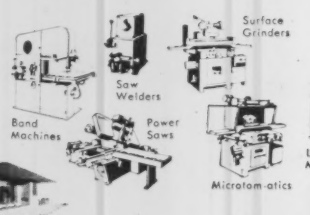
1. **FREE INSTALLATION SERVICE** to assure correct setup and full protection during initial operation.
2. **FREE OPERATOR TRAINING** certifies every operator you assign. In addition to personal instruction, special help includes "tip-sheets," wall charts and handbooks on latest techniques.
3. **FREE MACHINING ANALYSIS** is our specialty to keep your DoALL machines at full efficiency as new materials, new jobs and special requirements develop in your production.
4. **FREE MACHINE FIXTURING** helps to obtain peak performance in production of duplicate parts. Service includes sketches, recommending fixtures proved on similar jobs. Saves your time and money . . . prevents costly, needless experiments.
5. **FREE JOB-SPOTTING** within your plant keeps your DoALL machines busy. We can evaluate many jobs you may have overlooked—jobs your DoALL machines can do at lower cost.
6. **FREE MACHINE INSPECTION** — periodic inspection includes minor adjustments and reporting signs of wear—with timely tips to correct these conditions. Written Certificate of Inspection is furnished.
7. **DoALL PACKAGE SERVICE** provides a uniform, high-quality service at lowest possible costs from basic overhaul to production maintenance and modernization. Safeguards your DoALL machine investment . . . assures continuous profitable returns.

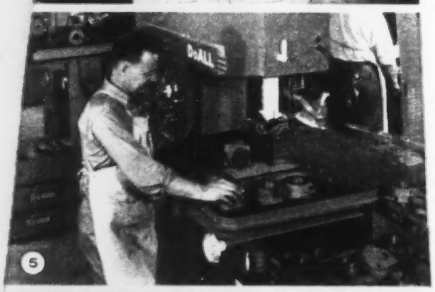
These exclusive services are administered by over 200 factory-trained engineers, one of whom is located *near* your plant.

CALL TODAY FOR FREE MACHINE CHECKUP

Ask your nearby DoALL store to give your DoALL machines a complete inspection and operation test—free of charge!

This is a typical DoALL Store

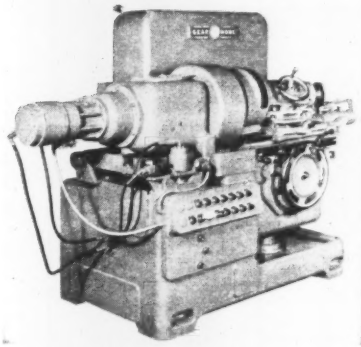




THE DoALL COMPANY, Des Plaines, Illinois

S-1

NEW PRODUCTS and equipment

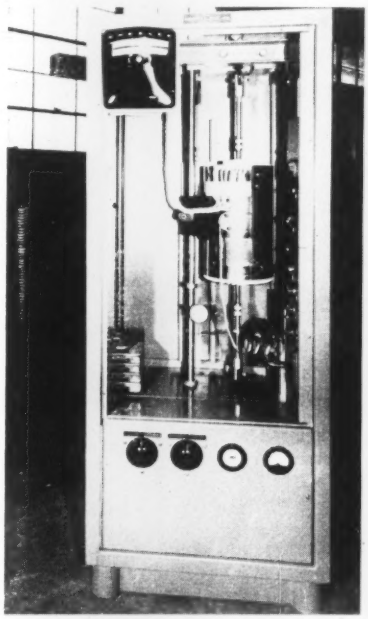


National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. *Phone*: Walnut 1-8980

Testing Machine

The New M is a creep rupture tester with a 6000-lb capacity. Its front is open, permitting easy access to the furnace and control panel.

The lever system is completely counterbalanced. Lever ratio is 16 to 1.



The electric controller has no mechanical linkage. It will detect motion within 0.00025 in. The beam remains level no matter how far the sample stretches. *Write*: Arcweld Mfg. Co., P. O. Box 311, Grove City, Pa. *Phone*: 1470

NEW literature

Write directly to the company for a copy

Index Table

A numerically controlled digital table with infinite resolution from 1 to 21,600 minutes of arc is described in this 4-page bulletin. Modern Engineering Service Co., 1695 Twelve Mile Rd., Berkley, Mich.

Large Induction Motors

Bulletin 1950, 16 pages, presents detailed information on a line of motors from 150 to 1250 hp. Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis.

Hydraulic Valves

Bulletin 210, 12 pages, describes pipe connected, flange connected, and subplate mounted valves operated by lever, cam, or foot. Rivett Inc., Brighton 35, Mass.

Shaft-Mounted Drives

Bulletin 7100 presents selection information on shaft-mounted drives. Standard applications are shown. Falk Corp., 3001 W. Canal St., Milwaukee, Wis.

Pumps

Triplex pumps are described in Bulletin 1157. They are used where pressures up to 20,000 psi and temperatures over 500° F are required. Kobe Inc., 3040 E. Slauson Ave., Huntington Park, Calif.

Fasteners

A 28-page catalog describes locknuts and fasteners and gives application and cost data. Palnut Co., 61 Glen Rd., Mountainside, N. J.

Solid Film Lubricant

Bulletin 2049, 4 pages, includes data on wear life versus load at various speeds, friction properties, physical properties, and fluid immersion tests of a lubricant composed of 90 per cent molybdenum disulfide and 10 per cent graphite. Electrofilm Inc., P. O. Box 106, North Hollywood, Calif.

Atomic Valves

This 4-page bulletin describes the design principles and quality controls needed to produce valve and fitting castings for nuclear service. Cooper Alloy Corp., Hillside, N. J.

Welding Fittings

Weights of elbows, tees, returns, caps, and reducers are listed in Bulletin FDC-250, 4 pages. Welded Fittings Dept., Tubular Products Div., Babcock & Wilcox Co., Milwaukee 46, Wis.

Electrolytic Grinding

Bulletin 115, 6 pages, illustrates the major uses of electrolytic grinding and lists the metals suited to the process. Anocut Engineering Co., 631 W. Washington Blvd., Chicago 6, Ill.

Fluid Power Drives

Bulletin 10600 on Any-Speed drives explains their advantages, operation, and characteristics. Oilgear Co., 15760 W. Pierce St., Milwaukee, Wis.

Roller Chains

Bulletin 507, 8 pages, lists attachments for standard and double pitch roller chains. It illustrates some of their uses. Diamond Chain Co. Inc., 402 Kentucky Ave., Indianapolis 7, Ind.

Floor Plates

Physical properties and capabilities of 11 and 16 gage, rolled steel floor plates are given in Bulletin AMC-1, 4 pages. Ackerman Mfg. Co., Wheeling, W. Va.

Hydraulic Presses

Uses and advantages of double and triple action, four column presses for deep metal drawing are described in Bulletin 7.13, 12 pages. Lake Erie Machinery Corp., Box 68, Kenmore Station, Buffalo 17, N. Y.

Refractories

High alumina in standard bricks, special shapes, and ramming mixes is covered in Bulletin 108, 4 pages. Ironton Fire Brick Co., Ironton, Ohio.

Pipe Mill

Use of variable speed drives in an electronically controlled resistance-weld pipe mill is described in Bulletin L-2505, 4 pages. Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

Dust Collectors

Bulletin A-9157, 6 pages, describes a line of wet and dry type dust collectors and auxiliary equipment. Ducon Co., 147 E. Second St., Mineola, N. Y.

Panel Coil

Design and estimating information for a coil used in industrial heating and cooling processes is given in this 4-page bulletin. Dean Thermo-Panel Coil Div., Dean Products Inc., 616 Franklin Ave., Brooklyn 38, N. Y.

Conveyors

In-floor and overhead systems for pulling trucks are described in this 4-page bulletin. Conveyor Systems Inc., 6451 Main St., Morton Grove, Ill.

Marking Machines

Offset printing units for steel, aluminum, and other surfaces are described in this 5-page bulletin. Jas. H. Matthews & Co., 3746 Forbes St., Pittsburgh 13, Pa.

Gages

Proper care and handling of gages, their finishes, and tolerances are described in this catalog. Dorsey Gage Co. Inc., Hyde Park, N. Y.

Gas Equipment

Catalog 1570 illustrates and describes gas equipment, including special lines and manual and automatic controls. Dimensional and Btu performance tables, temperature curve and work rate charts are

provided to help the buyer determine his heat range and other requirements. Charles A. Hones Inc., Baldwin, N. Y.

Variable Speed Drives

Bulletin 193-1-58 illustrates several Speed-trol motor applications and a complete line of variable speed drives. Sterling Electric Motors Inc., 5401 Telegraph Rd., Los Angeles 22, Calif.

Blanking Press

This 4-page bulletin describes a press with a capacity of 400 tons that can blank material up to ½ in. thick. Minster Machine Co., Minster, Ohio.

Instrument Ball Bearings

Data are presented in a 12-page bulletin on radial and axial play, axial take-up and preloading, as well as isoelastic bearings, and the achievement of system isoelasticity. Barden Corp., Danbury, Conn.

Electronic Comparator

This 8-page bulletin describes the use and specifications of an instrument with on-the-job accuracy of 0.00002 in. Threadwell Tap & Die Co., Greenfield, Mass.

Industrial Hose

A 32-page catalog covers use, selection, and mounting of hose; hose types; reusable couplings; straight and angle swivels; hose stems; and hose assemblies. J. N. Fauver Co. Inc., 51 W. Hancock Ave., Detroit 2, Mich.

Grinding Machines

Bulletin MS-57, 4 pages, describes an electronic amplification unit which enables the operator to set the swivel table quickly to close limits. Landis Tool Co., Waynesboro, Pa.

Chucks

Catalog 58 describes a line of chucks, demagnetizers, and chuck control equipment. O. S. Walker Co. Inc., Worcester 6, Mass.

Metal Stripper

Bulletin 46, 3 pages, describes a liquid acid immersion stripper which will remove all coatings except heavy chromium and precious metals from stainless steel or aluminum. MacDermid Inc., Waterbury, Conn.

Drill Jig Bushings

Catalog 35875 describes a complete line of ASA and standard bushings including aircraft types. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Chemical Milling

Advantages, uses, and methods of chemical milling are described in a 10-page bulletin. Contract Engineering Dept., U. S. Chemical Milling Corp., 1700 Rosecrans Ave., Manhattan Beach, Calif.

Hand Trucks

Uses and specifications of hand and platform trucks are given in this 6-page bulletin. Fairbanks Co., 393 Lafayette St., New York 3, N. Y.

Electrical Controls

All-purpose controls suitable for use with virtually any detectable variable are described in Bulletin 106, 12 pages. Assembly Products Inc., Chesterland, Ohio.

Compressed Air Dryers

This 12-page bulletin describes heatless, self-activating, zero dew point dryers that prevent moisture fouling. Van Products Co., 5784 Swansville Rd., Erie, Pa.

Silicone Compounds

Bulletin SF-1010A, 8 pages, describes organo-silicone polymers with good lubricating and solubility properties. Silicones Div., Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

Flexible Couplings

Full-floating couplings for connecting shafts that are placed far apart are described in Bulletin 98, 4 pages. Thomas Flexible Coupling Co., Warren, Pa.

Lift Truck Maintenance

This 32-point checklist helps lift truck users avoid unnecessary repairs by outlining a preventive maintenance program. Towmotor Corp., Cleveland 10, Ohio.

Large Synchronous Motors

Vertical and horizontal motors of 1500 hp and over with speeds of 514 to 1800 rpm are described in Bulletin GEA-6620, 8 pages. General Electric Co., Schenectady 5, N. Y.

Way Protectors

Accordion-type protectors fabricated from neoprene-base materials that can be applied to all types of ways, cross rails, and head spindles are described in this 4-page bulletin. A & A Mfg. Co. Inc., 712 S. 12th St., Milwaukee 4, Wis.

Tank Lining

Properties and uses of an acid-proof tank lining are covered in this 8-page bulletin. Maurice Knight Co., 171 Kelly Ave., Akron, Ohio.

Abrasive Belt Grinding

Over 30 case histories showing how to speed production and reduce costs are covered in this 24-page bulletin. Engelberg Huller Co., 831 W. Fayette St., Syracuse, N. Y.

Printed Circuits

The use of ammonium persulfate for etching printed circuits is described in Bulletin 90, 7 pages. Becco Chemical Div., Food Machinery & Chemical Corp., Station B, Buffalo 7, N. Y.

Wire Rope Inspection

Bulletin 90, 4 pages, describes equipment for the nondestructive testing of ferromagnetic rope wire. Magnetic Analysis Corp., 42-44 Twelfth St., Long Island City 1, N. Y.

Ball Bearings

This 4-page bulletin lists bearings with a one-piece race and a ball cage and a line of single row radial ball bearings. Schatz Mfg. Co., Poughkeepsie, N. Y.

Turret Lathes

Automatic ram type machines equipped with hydraulic drives are described in this 10-page bulletin, 1182-A. Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.

Shears

Power and hand operated ring, circle, and slitting shears are described in Bulletin 80-RC, 8 pages. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

Air Gage Members

This 20-page manual-brochure illustrates and describes back pressure, flow type, and differential air gages. Specifications and tables are included. Freeland Gauge Co., 9940 Freeland Ave., Detroit 27, Mich.

Brochure for Industry

Brochure Q-23A is devoted to drives for steel mill auxiliaries, material handling equipment, sintering plants, tube mills, and hot and cold rolling mills. Elliott Co., Jeanette, Pa.

System Thermometers

Catalog C60-2 describes a line of indicators, recorders, transmitters, and electric and pneumatic control instruments. Industrial Div., Minneapolis-Honeywell Regulator Co., Wayne and Windrim Avenues, Philadelphia 44, Pa.

Quick Fasteners

This 24-page catalog describes three lines of quarter-turn fasteners. Fastex Div., Illinois Tool Works, 195 Algonquin Rd., Des Plaines, Ill.

Arc Welding

Catalog 2300, 24 pages, describes the equipment used in inert gas shielded, tungsten arc welding for joining light gage metals. Air Reduction Sales Co., division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

Switches

A series of rocker-actuated switches which combine the advantages of toggle and pushbutton control are described in a 4-page bulletin, 141. Micro Switch Div., Minneapolis-Honeywell Regulator Co., Freeport, Ill.

Strap Stretcher

This 8-page bulletin describes a continuous take-up tensioning tool that is manually operated and can be used in any position. Acme Steel Co., 135th Street and Perry Avenue, Chicago 27, Ill.

Threaded Fasteners

This catalog covers high and washer base closed-end cap nuts, wing and thumb nuts, and thumb and wing screws. A special section features nylon fasteners, insulators, bushings, washers, and specials. Gries Reproducer Corp., 125 Beechwood Ave., New Rochelle, N. Y.

Junction Boxes, Housings

This 16-page bulletin (B.158) contains selection and specification data for cast aluminum weatherproof and explosionproof

NEW LITERATURE . . .

housings. Explosionproof sealing fittings are also shown. Adalet Mfg. Co., 14300 Lorain Ave., Cleveland 11, Ohio.

Tape Control

Tape control systems for machine tools are described in BR-1, a 12-page catalog. Typical machine modification and specifications for tape setup are covered. Controls Section, Bendix Aviation Corp., 21820 Wyoming Ave., Oak Park, Mich.

Portable Piping

Advantages of a lightweight steel piping system that can be set up or broken down in a few minutes, and the uses for such equipment are covered in this brochure. Steel & Tubes Div., Republic Steel Corp., 224 E. 131st St., Cleveland 8, Ohio.

Rectifiers

A 32-page guide covers applications of metallic power rectifiers that use semiconductors in anodizing, chargers, electrocleaning, plating, power supplies, and power conversion. Sel-Rex Corp., Nutley, N. J.

Eliminating Water Spotting

Data sheet RP-100 describes a rust preventive oil used to eliminate water spotting of parts after degreasing and rinsing, and after water cooling or testing. Octagon Process Inc., 33 Bank St., Staten Island 1, N. Y.

Standards Catalog

List and Index of American Standards, 67 pages, covers the 1723 voluntary national standards approved by the American Standards Association. Included are 465 new and revised standards. Dept. DD-7, American Standards Association, 70 E. 45th St., New York 17, N. Y.

Tool Catalog

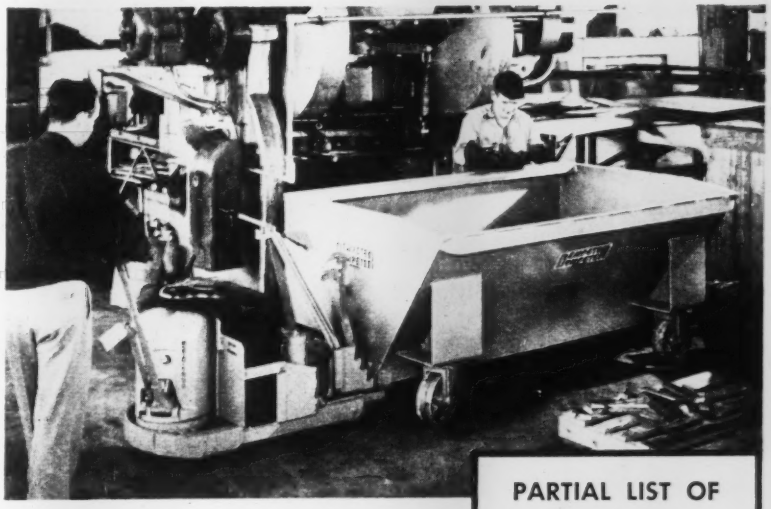
Catalog N 12 contains information on small industrial tooling. Dixie Tool Industries Inc., Bridgeport, Mich.

NEW BOOKS

Gray Iron Castings Handbook, Charles F. Walton, Gray Iron Founders' Society Inc., Cleveland, Ohio. 620 pages, $10.

Here is information on how to successfully and economically design, purchase, and use gray, ductile, white, and high alloy iron castings. A 190-page section covers the significant engineering properties of these irons. Advantages of heat treatment are discussed. Times, temperatures, and cooling rates required are included. Welding, machining, grinding, and coating also are covered.

Industrial Leaders "CONTAINERIZE" Waste As It Accumulates



Dempster-Dumpster System Provides Temporary Storage at Points of Waste Accumulation

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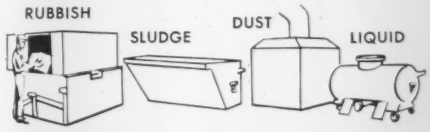
North American Aviation, Inc.
Republic Steel
Reynolds Metals
Standard Oil Company
U. S. Gypsum
U. S. Rubber Co.
U. S. Steel
Westinghouse



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Market Outlook

ALTHOUGH steelmaking operations are still declining, producers see better days ahead. Says one industry spokesman: "We're pretty well past the low point right now." Some companies are beginning to call men back to work. Example: U. S. Steel Corp.'s National Tube Div. at Lorain, Ohio.

Hopes for a gradual upturn beginning in March are based on: 1. The likelihood of seasonal improvements in the big steel consuming industries—automotive and construction. 2. The feeling that customers' inventories are approaching rock bottom. Stock reductions would have been completed long ago, say the producers, if consumption hadn't lagged.

REVISE FORECAST— Much as they're hoping for a spring tonic, steelmakers have few illusions about recouping production lost during the first two months. Last week, the operating rate dropped another point to 52.5 per cent of capacity. Production was about 1,420,000 net tons of steel for ingots and castings, compared with 2,504,000 tons a year ago. It's conceded that December's forecast for 1958 (111 million tons) was a little too optimistic.

ANOTHER 1954?— Asked to compare current conditions with those of other years, a market analyst declares: "We're about where we were in August, 1954." If he's right, we can expect a business upturn that will gain momentum every month. After steelmaking operations dropped to 62.5 per cent of capacity during the last week of August, 1954, improvement was noted in warehouse buying. Then automotive orders picked up. In four months, the operating rate rose 20 points to a yearend reading of 82.5 per cent.

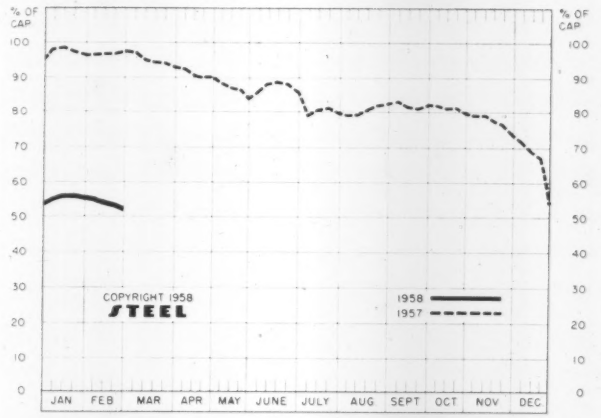
AUTOMAKERS HOPEFUL— Plagued by mounting dealer inventories, automakers think they'll "bottom out" of the sales doldrums in February. Cleveland car dealers report modest increases in floor traffic and high hopes for a spring upturn. But the picture is less encouraging nationally. With automakers planning lower output, producers of cold-rolled sheets see no substantial improvements in March or April.

BUILDERS WAITING— Stymied by the winter's worst weather, structural fabricators will soon have easier sledding. Bridge construction will pick up as the federal highway program gains momentum. Producers of highway reinforcing material—rods and welded fabrics—expect a fair increase in orders for March and April delivery. Despite a drop in industrial building, new construction is slated for a $2-billion increase this year (see Page 35).

INVENTORIES DOWN?— National Supply Co., Pittsburgh, says oil country tube users are still living off their stocks. Major oil producers won't complete inventory reductions for two or three months because of slack drilling activity. Some wildcatters are trying to do without inventories, relying on warehouses and mills for prompt delivery. Says one steel producer: "Our guess is that there are almost no products on which inventories aren't still being liquidated. By midyear, customers' stocks will be down and probably dangerously low."

SCRAP EASES— Reversing the bullish trend of recent weeks, STEEL's price composite on No. 1 heavy melting grade dropped 50 cents—to $37.17 a gross ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Feb. 23	Change	Same 1957	Same Week 1956
Pittsburgh	58	+ 1*	101	103.5
Chicago	59	+ 1.5*	97	99
Mid-Atlantic	75	— 1	98.5	101
Youngstown	54	0	104	100
Wheeling	58	+ 1	101	99.5
Cleveland	23.5	—13*	97.5	103.5
Buffalo	44	— 2.5	107.5	105
Birmingham	49.5	— 2	95.5	95
New England	52	+ 2	70	75
Cincinnati	50.5	+ 6.5*	89	97
St. Louis	80	+ 3	98	106
Detroit	53.5	+ 2*	102	102.5
Western	63	— 3	105	108
National Rate	52.5	— 1	97.5	99.5

INGOT PRODUCTION‡

	Week Ended Feb. 23	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	90.8†	90.0	93.1	155.9
NET TONS (In thousands)	1,459†	1,445	1,496	2,504

*Change from preceding week's revised rate. †Estimated. ‡American Iron & Steel Institute. Weekly capacity (net tons): 2,699,173 in 1958; 2,559,490 in 1957; 2,461,893 in 1956.

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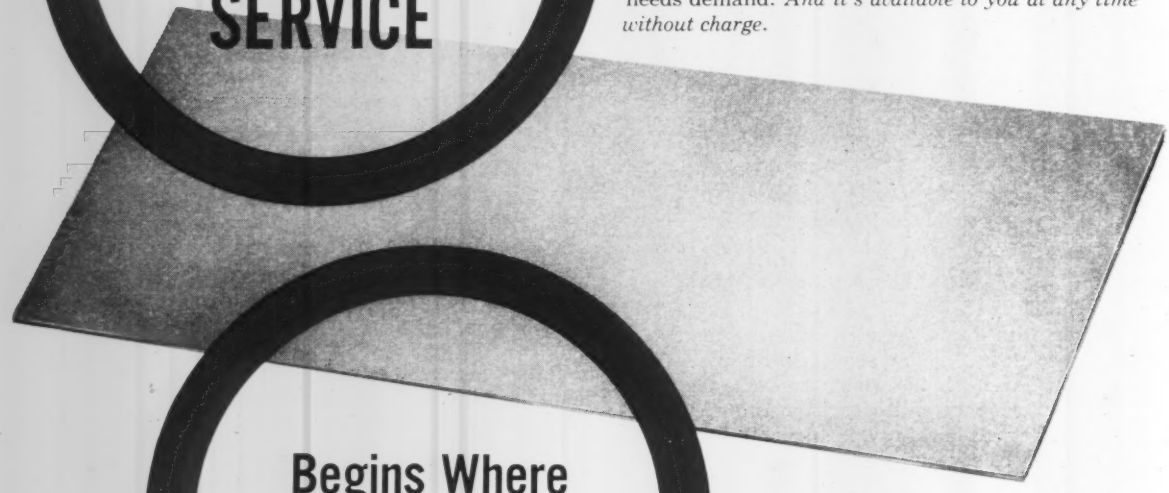

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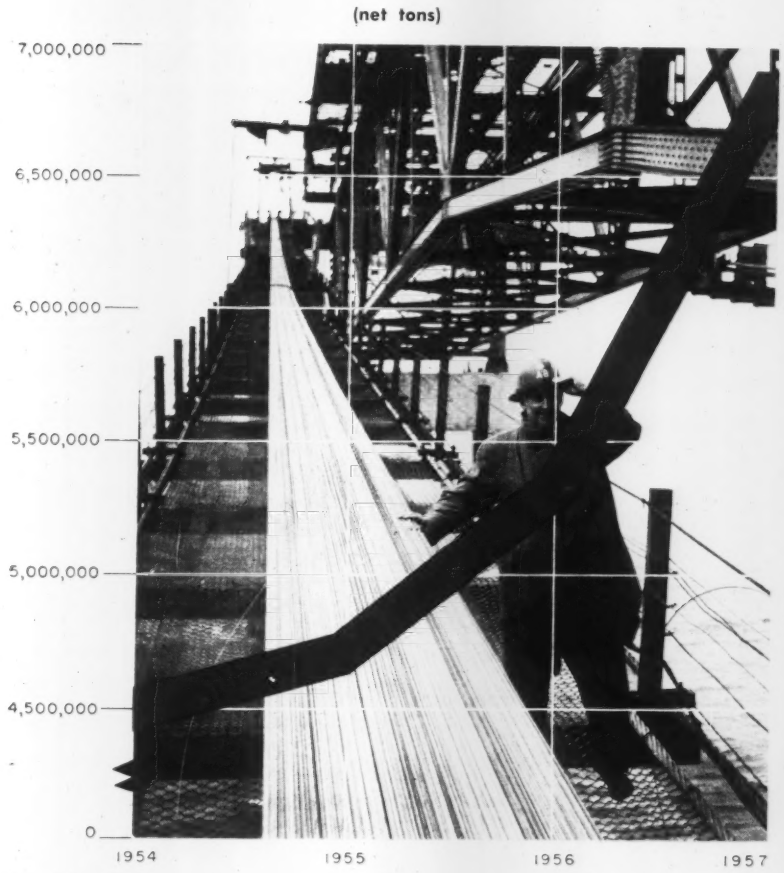
Structural Steel Shipments Climb



*Estimated.

American Bridge's A. J. Paddock says . . .

Structurals Aplenty Now

"WE HAVE caught up with demand for fabricated structural steel, and we intend to keep up with it. Engineers and designers can specify structural steel freely from now on."

So says Austin J. Paddock, president of American Bridge Div., U. S. Steel Corp., Pittsburgh. The division has steel to sell for quick delivery in 1958—a development which is in sharp contrast with the critical shortages of recent years.

Bookings Drop—Structural steel eased quickly in late '57 and early '58 because mill capacity expanded while orders plunged. In December last year, bookings of fabricated structural steel dropped 69 per cent below those of December, 1956, reports the American Institute of Steel Construction. Orders came to 2,780,645 tons in 1957, vs. 4,013,186 tons the year before—a 31 per cent decline. But shipments in 1957 hit a record 3,651,973 tons—a 14 per cent increase over 1956's.

The fabricated structural steel backlog now stands at about 2 million tons, vs. 3.5 million one year ago.

No Bottlenecks—Structural steel suppliers have no fear of shortages this year. Previous scarcities cost them considerable business. Several mills are raising their capacities to produce structural shapes, giving top priority to wide-flange beams. The trend to greater use of this product in bridges and buildings contributed to the shortages of postwar years.

Last September, Inland Steel Co., Chicago, announced a program to double its wide-flange beam capacity. By mid-1959, it will be able to supply 54,000 tons per month.

More from Bethlehem—Bethlehem Steel Co.'s capacity to produce structural shapes at Bethlehem, Pa., was 140,000 tons per month in 1955. A two-year expansion drive raised the figure to 210,000 tons. Of the added capacity, 60,000 tons is for wide-flange beams.

U. S. Steel Corp. is building a rolling mill at South Chicago, Ill., for wide-flange beams and other structurals. Emphasis on wide-flange beams also prompted it to add soaking pits and auxiliary facilities at its Homestead Works, Munhall, Pa., last year. During 1957, Homestead's ingot capacity was increased by 224,000 tons. Extra capacity is available for structural shapes.

Outlook: By mid-1959, the corporation's structural steel capacity is expected to be about 35 per cent greater than it was on Jan. 1, 1957. The steel industry will have capacity to produce 7.9 million tons by 1959, 1 million more than it turned out last year (see chart).

Shift in Markets—Steel producers don't expect their new capacity to lie idle, despite declines in commercial and industrial construction. A sales manager comments: "Demand for steel in big construction projects is dropping, but we are filling more small orders for light shapes used in school or shopping center construction."

Long Term Look—Mr. Paddock adds: "We have no doubts about the strength of long range demand for structural steel. We will see a steady trend to greater use of fabricated steel in bridge and building construction.

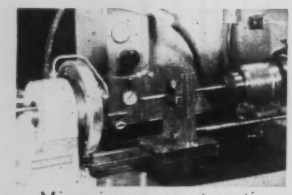
"Engineers and architects are able to reduce the weight of some structures as much as 15 to 25 per cent

WHY "150" HYDROHONER

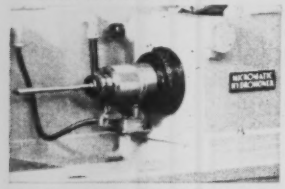
Reduces Costs . . .
Assures Controlled Finish . . .
Provides Rapid Stock Removal

To assure rapid stock removal and consistent generation of surface finish desired, the low-cost "150" Hydrohoner utilizes the distinctive Microhoning characteristic of self-dressing abrasives. Because abrasive grits are kept sharp-cutting at all times by a combination of controlled pressure and reciprocating-revolving motions of tool, a constantly high cutting efficiency is effected.

Basic "150" Hydrohoner —delivered from stock.



Microsize gage automatically ends cycle when exact size is reached.



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through modern design," he continues. "Better bending, forming, and welding equipment in the fabricating shops make for greater versatility. In the field, use of high strength bolts or welding speeds steel erection. In addition, engineers and designers have new and stronger steels available."

More People, More Buildings—Mr. Paddock concludes: "With our population continuing to grow and with the standard of living steadily moving up, construction will continue to gain. Buildings become obsolete with the trend to longer, lower structures. Highway building will add gradually to structural steel demand. The highway program should take about 10 per cent more steel this year than it did last year."

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 121

Some construction projects scheduled to start during the first quarter in the Los Angeles area have been delayed. But a seasonal pickup in building, led by highway projects, is anticipated in March. It should stimulate activity in the reinforcing steel market.

Bids are in for the Seattle Viaduct extension, a Washington State project involving 3040 tons of reinforcing steel. Public works and highway projects show increasing activity in the Pacific Northwest, and a strong demand for reinforcing bars in the area is in prospect. Washington State jobs opening Mar. 4 involve 500 tons of bars; Oregon road projects, also to be bid in March, will require more than 500 tons.

Structural Shapes . . .

Structural Shape Prices, Page 121

Inquiry for structurals is only slightly better than it was, but a steady accumulation of work on architects' boards serves to buoy up market sentiment.

More structural fabricating shops in the East have reduced backlogs to the point they are bidding for tonnages ignored six months ago. That means competition and price shading. Contractor's unit bids are more generally under engineers' estimates, but prices of structural steel in place have not softened as

much as have fabricating shop estimates.

New England bridge inquiry is up moderately, but tonnage the first two months of this year is down 10 per cent from that in 1957. Commercial and industrial work continues to decline at Pittsburgh. Cold weather is a deterrent to work on current building projects.

Supplies are relatively easy. Although some shapes are not rolled every month, users can generally obtain deliveries within a month. The trend is reported to demand for lighter sections.

Steel Bars . . .

Bar Prices, Page 121

Bolt and nut manufacturers are holding substantial stocks of bars. Accordingly, they are specifying lightly. Also, most producers of cold-drawn bars are well stocked and can give prompt deliveries in most sizes.

Over-all, bar demand is slack in the East, and carbon bars are available in that area in two weeks, alloy bars within three to four weeks. Some deliveries of the carbon grades can be had within a week.

Similarly, sluggish market conditions prevail at Buffalo and Cleveland. Consumers are getting along with extremely light inventories, gearing purchases closely to needs. Curtailed manufacturing operations serve to stretch out consumers' stocks.

Cold-drawn bar production is down in New England. Only one of six district converters is operating five days a week, one turn. All area redrawers are well stocked with hot-rolled bars. Most sizes and grades can be had within one week to 10 days. Ground and turned stock shipments are somewhat more extended, but such specialties also are available well ahead of normal leadtime.

Forge shops are buying small lots for prompt shipment. In some cases, they have "dead" stock on hand (bars bought for specific forging orders that have petered out).

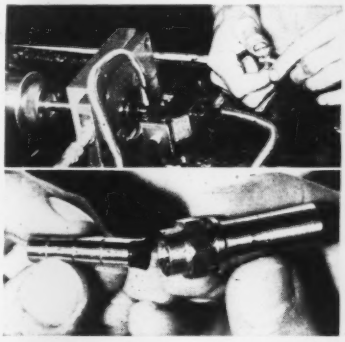
Preliminary electric furnace heats are being produced by Carpenter Steel Co. of New England Inc., successor to Northeastern Steel Corp., Bridgeport, Conn. Only high grade alloy bars, stainless bars, and tool

HOW Manufacturers Use "150" HYDROHONER To Reduce Costs...Control Finish... Obtain Rapid Stock Removal

Leading Manufacturers of precision parts are using the low-cost "150" Hydrohoner to secure high production, rapid stock removal, geometrical precision and controlled surface finishes. Indicative of the versatility for application of this highly efficient honing machine are the following recent installations:

The crankpin bore of a compressor connecting rod is Microhoned on a "150" Hydrohoner within tolerances of .00015" for taper, and .0002" for size and out-of-roundness. From .0008" to .001" of stock is removed from the bore (.875" diameter x .43" long) in about 8 seconds, while obtaining an 8 Microinch finish.

In this installation, a "150" is Microhoning in two runs the bore (.313" diameter x 1.375" long) of a braking cylinder. The first run removes between .004" and .006" of stock in 30 to 35 seconds. During finishing run, the final .0005" to .0008" is removed to provide geometric accuracy within .0002" tolerance and an 8 Microinch or better finish. Precision and controlled finish of bore prevent hydraulic oil leakage and minimize wear of neoprene-cupped piston.



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☐ Please have a Micromatic Field Engineer call.
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steel bars will be produced at Bridgeport. Annual capacity of the plant is 85,000 tons.

Philadelphia area consumers continue to buy hand to mouth, generally requesting deliveries within two weeks and getting them. The situation applies to hot carbon and cold drawn grades. Alloy deliveries are a little more extended because of extra processing. Alloys, though, are in relatively easy supply.

As late as mid-February several Pittsburgh district producers of hot rolled and cold drawn bars had booked insufficient March tonnage to indicate any turn for the better in store that month.

Tin Plate . . .

Tin Plate Prices, Page 123

Canmakers are planning an active production year. That means current strong demand for tin plate will hold for some time ahead. In the case of some mills, tin plate production is the only activity running at, or close to, capacity.

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Plates . . .

Plate Prices, Page 121

A major Pittsburgh producer reports moderate firming in demand for plates. Several fairly large orders for March delivery have been booked. February orders were small; volume was not sufficient to change the market situation.

Gradual improvement in needs for highways and bridges is anticipated. Shipbuilders' requirements are slowing up, but line pipe needs are being deferred, and orders of railroad equipment makers are noticably less pressing.

Most eastern sellers of sheared carbon plates can give deliveries within two to three weeks. Producers of strip-plate can do still better. Sheared plate producers anticipate a spring pickup in buying, especially for tanks and miscellaneous construction. Ship needs will be stepped up as result of the recent placing of four merchant vessels, each requiring about 7500 tons of hull steel—5000 tons will be plates and the remainder shapes.

Small New England tank shops report mild seasonal improvement in demand. Volume is small, though. Most consumers have substantial plate inventories.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 122 & 123

Sheet steel demand continues dull. Bookings for March delivery are only slightly better than they were for February. The outlook for a gain in sales to the auto builders seems as dim as ever, and those who have been looking to autos to spur an upturn in buying now are less hopeful.

Heavier orders should be coming out now on automotive account if the auto builders, confronted with a possible strike at midyear, plan to build up a stock of finished cars before June. Suppliers of parts at least should be getting releases for longer runs.

Inventories are still being cut back, but stocks of some users are said to be dangerously low. Prompt shipments are being depended upon in increasing degree. Hot rolled can be had within two weeks and cold rolled within three to four. Galvanized sheets and flat-rolled specialties are available for early

delivery. There's no sign of a pick-up in electrical sheets.

The big weakness in the sheet market at Buffalo is the slack demand on automotive account. District steelmakers don't expect much improvement in the situation until April. They think the upturn then will be slow to develop, though stockpiling of automobiles against a summer automotive strike should spur some buying in second quarter.

West coast producers anticipate improved demand in March, particularly on automotive account.

A moderate increase in government requirements is expected during the second quarter. Included are 350 tons for the Raritan Arsenal, Metuchen, N. J., the inquiry calling for annealed, cold rolled, 48 by 96 in., 0.0478 gage.

Tubular Goods . . .

Tubular Goods Prices, Page 125

Here could be the first sign of a revival in the tubular goods industry: Operations have been resumed at No. 2 and No. 4 seamless mills at the Lorain (Ohio) Works, National Tube Div., U. S. Steel Corp. The mills were shut down four weeks ago.

The division also is adding two open hearth furnaces to its active furnace list, and it is stepping up activity on its No. 3 mill which produces line pipe.

Resumption of these operations is due to an accumulation of an order backlog. About 1000 workmen will be recalled—4300 of the division's 11,000 employees have been idle for some weeks.

A. W. McKinney, president, National Supply Co., Pittsburgh, says the long range outlook for the oil industry is bright, even though there is no sign at present of an immediate pickup.

Industry sources forecast curtailed drilling in 1958. It could mean that less oil field machinery, pipe, and supplies will be required. The general decline in business also affected demand for industrial tubular items.

A more encouraging sign for the tubemakers is the prospect that inventory reduction by the oil well drillers should be completed early in the second quarter.

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tion, representing west coast producers, and the American Foundry Co. has asked the Federal Tariff Commission to increase the tariff on imported cast iron soil pipe and fittings from 10 to 25 per cent.

Foreign cast pipe and fittings are coming principally from Great Britain, France, Denmark, Japan, and Mexico.

The average price of imported pipe in 1956 was about $100 a ton, against the average domestic price in the West of $175. Those petitioning for tariff relief say the margin is so great they are unable to meet the foreign competition.

The city of Everett, Wash., has called bids for installation of 15,480 ft of 42 and 48 in. welded steel pipe for the Sultan River supply line. The city will furnish materials which were previously awarded to a Portland, Oreg., fabricator.

Metal Can Shipments Slip

Metal can shipments totaled 4,603,740 net tons in 1957, vs. 4,785,671 tons the year before, reports the U. S. Census Bureau. December shipments were 292,210 tons, against 285,436 tons in November and 267,144 tons in December, 1956.

Fruit and vegetable can shipments last year amounted to 1,491,710 tons, against 1,630,825 tons in '56. December shipments amounted to 68,374 tons, against 67,026 tons in November and 54,432 tons in December the year before.

Beer cans (second largest category) accounted for 791,507 tons in 1957, vs. 767,319 tons in 1956. December shipments were 56,515 tons, against 45,678 tons in November and 46,802 tons in December, 1956.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 127

Colorado Chemical Engineering Laboratories, Boulder, Colo., is working on a project to make coke from low-grade coal mined in the West competitive with coke from high-grade eastern fuel. The experiments are said to be with a fluid charring process. A spokesman says, "We can make good coke right now," but the firm is trying to streamline the process.

Bids will be called soon on 300,000 tons of coal for the Han-

Shipments of Steel Products—December, 1957

(All Grades; Net Tons)

Products	—December Tonnage Movement— Carbon	Alloy	Stainless	—Totals for Year— 1957	1956
Ingots	14,397	14,277	636	467,456	702,744
Blooms, etc.	84,631	25,483	694	2,307,901	2,275,640
Tube rounds	2,544	340	.....	55,150	12,530
Skelp	5,358	.....	.....	152,949	197,825
Wire rods	63,137	1,314	281	961,913	1,132,434
Structurals (heavy)	505,027	4,873	7	6,817,796	5,348,981
Steel piling	38,036	.....	.....	569,673	434,103
Plates	594,904	39,670	1,633	9,248,625	7,714,623
Rails (standard)	48,806	.....	.....	1,194,405	1,201,354
Rails (all other)	5,234	.....	.....	88,563	98,362
Joint bars	2,094	.....	.....	79,942	81,557
Tie plates	1,395	.....	.....	230,941	298,201
Track spikes	1,548	.....	.....	73,752	93,467
Wheels	28,438	78	.....	386,512	348,396
Axles	13,994	11	.....	210,760	171,780
Bars (hot rolled)	350,045	102,147	2,355	7,567,400	8,840,349
Bars (reinforcing)	99,878	.....	.....	2,300,127	2,518,691
Bars (cold finished)	66,850	13,905	2,813	1,319,288	1,736,369
Tool steel	693	6,017	.....	98,712	125,866
Standard pipe	144,815	81	.....	2,664,469	2,927,308
Oil country goods	114,862	30,198	.....	2,822,854	2,560,223
Line pipe	295,059	.....	.....	4,218,513	3,376,663
Mechanical tubing	30,149	17,859	146	773,945	949,846
Pressure tubing	14,558	4,265	1,266	395,346	384,988
Drawn wire	159,610	3,112	1,510	2,598,390	2,988,377
Nails & staples	19,091	.....	1	447,301	557,283
Barbed wire	2,111	.....	.....	59,125	74,318
Woven wire fence	9,096	.....	.....	202,652	273,352
Bale ties-baling wire	950	.....	.....	48,122	49,672
Black plate	35,418	.....	.....	610,108	765,055
Tin plate (hot dipped)	21,633	.....	.....	649,974	950,070
Tin plate (electro)	214,215	.....	.....	4,676,482	4,615,068
Sheets (hot rolled)	493,154	25,291	2,080	7,829,992	8,790,540
Sheets (cold rolled)	900,841	1,999	7,795	11,879,354	13,317,002
Sheets (galvanized)	159,363	.....	.....	2,392,637	2,957,991
Sheets (other coated)	17,824	.....	.....	207,853	226,556
Elec. sheets & strip	5,561	31,357	.....	618,863	813,381
Strip (hot rolled)	90,324	1,520	666	1,392,460	1,796,157
Strip (cold rolled)	78,565	1,439	13,583	1,274,262	1,544,646
Totals (1957)	4,732,208	325,239	35,466	79,894,577	.....
Totals (1956)	6,528,170	473,536	62,387	.....	83,251,168

Data from American Iron & Steel Institute.

1¾" through 8" Bolt Diameter

Of course, our fasteners aren't quite this big, but we do make the largest nuts, bolts, studs and eye bars in the metalworking industry. Save time and money by letting specialists fabricate your large fasteners of all types. Made in a factory devoted exclusively to their manufacture. Complete steel stocks. Modern testing and heat treating facilities.

Send For The Dyson Large Fastener Catalog
36-page catalog contains dimensions, specifications and prices on Dyson large forged nuts, plus data on large eye bars, bolts and studs.

Joseph DYSON & SONS, INC.
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ford (Wash.) Works, Atomic Energy Commission. Delivery is scheduled for the year beginning July 1. Bids will be considered in lots of 50,000 tons or more. This purchase is projected as a government aid to distressed mining areas at Roslyn-Cle Elum, Wash., and Roundup, Mont.

Warehouse . . .

Warehouse Prices, Page 126

Most distributors are booking tonnages at about January levels. Over-all shipments this month probably will be somewhat lower.

One distributor in the Pittsburgh district says sales are 10 per cent below those in the fourth quarter, 1957. Lack of strong demand for a single product is responsible for the drop from fourth quarter levels. With construction activity slow, structural shapes and plates are in weak demand. Improved mill deliveries make it possible for users to fill many of their requirements from mill sources.

Warehouses have the largest stocks of products they have held in recent years. They are considered topheavy in some categories. Virtually all types of steel are available for immediate delivery.

Distributors in the Philadelphia area have advanced galvanized sheet prices because of increases posted by mills on size extras. They are quoting No. 10 gage galvanized sheet at 9.92 cents a pound, compared with 9.87 cents previously.

U. S. Steel Supply Div., U. S. Steel Corp., Pittsburgh, has installed a slitting line in its San Francisco warehouse. Sheet coils of 10 to 30 gage in 0.25 in. to 36 in. widths are available.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

940 tons, state highway bridge, Jenkintown, Pa., through F. A. Canuso & Sons, Philadelphia, general contractor, to Bethlehem Fabricators, Bethlehem, Pa.; this contract was erroneously reported in the Feb. 17 issue as going to another fabricator.

400 tons, Park Road Bridge, Washington, D. C., through Ole Hansen & Son, Pleasantville, N. J., general contractor, to the American Bridge Div., U. S. Steel Corp., Pittsburgh.

380 tons, state bridge work, Camden County, New Jersey, to the Elizabeth Iron Works, Elizabeth, N. J.

230 tons, Seattle Northwest Junior High School to Bethlehem Pacific Coast Steel Corp., Seattle; general contract to Wick Construction Co., Seattle, at $1,436,339.

150 tons, state bridge work, Northumberland County, Pennsylvania, to the Brannaka Welding Co., eastern Pennsylvania fabricator.

STRUCTURAL STEEL PENDING

4800 tons, section of state expressway, Bronx, New York, new bids asked for March 13.

1000 tons, including castings and miscellaneous, reconstruction of interstate Columbia River bridge, Vancouver, Wash., bids to the Oregon Highway Commission, Portland, Oreg., March 27; 531-ft steel span involved.

675 tons, also 2700 feet of concrete piling, Washington state, Skagit River steel truss highway span; bids to Olympia, Wash., March 4.

327 tons, state bridge work, Route 102, Section 2-D, and Route 28, Warren and Hunterdon counties, New Jersey, bids March 4; 590 tons of reinforcing steel also required.

315 tons, extension, Washington state highway viaduct, Seattle; bids in to Olympia, Wash.

REINFORCING BARS . . .

REINFORCING BARS PLACED

475 tons, women's dormitory, Boston University, Boston, to Concrete Steel Co., Boston; Vappi Construction Co., Boston, general contractor.

445 tons, electronic accelerator, Harvard University, Cambridge, Mass., to Northern Steel Inc., Boston; S. & A. Allen Construction Co., Boston, general contractor.

435 tons, addition, Lawrence Memorial Hospital, New London, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; W. J. Megin Inc., Naugatuck, Conn., general contractor.

357 tons, Washington state, Snohomish River Bridge, to Bethlehem Pacific Coast Steel Corp., Seattle; Anderson Bridge Co., Tacoma, Wash., general contractor.

310 tons, athletic department building, Massachusetts Institute of Technology, Cambridge, Mass., to Northern Steel Inc., Boston; George A. Fuller Co., Boston, general contractor.

275 tons, hospital, Norristown, Pa., to American Steel Engineering Co., Philadelphia.

255 tons, office building, Travelers Insurance Co., Boston, to U. S. Steel Supply Div., U. S. Steel Corp., Boston; George A. Fuller Co., Boston, general contractor.

250 tons, library, Drexel College, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

195 tons, law school building, Harvard University, Cambridge, Mass., to Northern Steel Inc., Boston; William Bailey Co., Boston, general contractor.

190 tons, state highway bridges, Wendell-Orange, Mass., to Northern Steel Inc., Boston; Bayer & Mingolla Construction Co., Worcester, Mass., general contractor; 590 tons, fabricated structural steel, to A. O. Wilson Structural Co., Cambridge, Mass.

165 tons, dormitory, Emmanuel College, Boston, to Bethlehem Steel Co., Bethlehem, Pa.

165 tons, dormitory, University of New Hampshire, Durham, N. H., to Bethlehem Steel Co., Bethlehem, Pa.

163 tons, Idaho highway project, to Allen Steel Co., Boise, Idaho.

115 tons, boiler plant, University of Massachusetts, Amherst, Mass., to Northern Steel Inc., Boston; Copabianco Construction Co., Boston, general contractor.

110 tons, Ballard High School, Seattle, to Joseph T. Ryerson & Son Inc., Seattle.

150 tons, Bond Brook and Mt. Vernon Avenue bridges, Augusta, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Ellis C. Snodgrass Inc., Portland, Maine, general contractor.

100 tons, junior high school, Seattle, to Northwest Steel Rolling Mills Inc., Seattle.

100 tons, addition, Memorial Hospital, Manchester, Conn., to Scherer Steel Co., Hartford, Conn.; Wadhams & May Co., Hartford, general contractor; 360 tons, fabricated structural steel, to Standard Structural Steel Co., Hartford.

85 tons, Seattle apartment structure, to Bethlehem Pacific Coast Steel Corp., Seattle.

55 tons, Washington state garage, Olympia, Wash., to Northwest Steel Rolling Mills Inc., Seattle; H. Halvorson, Seattle, general contractor.

REINFORCING BARS PENDING

1400 tons, highway structures, Section P, Central Artery, Union Park to Massachusetts Avenue, Boston; M. DeMatteo Construction Co., Quincy, Mass., general contractor.

1000 tons, head house works, Metropolitan District sewage project, Chelsea, Mass.

900 tons, municipal garage, Kingston and Bedford Streets, Boston; Wexler Construction Co., Boston, general contractor.

575 tons, high school, Dartmouth, Mass.

590 tons, state bridge work, Warren and Hunterdon counties, New Jersey, bids March 4; 327 tons of structurals also required.

500 tons, dormitory, Harvard University, Cambridge, Mass.

415 tons, electronics building, Lowell Technical Institute, Lowell, Mass.

415 tons, including tierods, etc., reconstruction of Washington-Oregon Columbia River Bridge; bids to the Highway Commission, Portland, Oreg., March 27.

315 tons, building, state hospital, Westboro, Mass.; Joseph Rugo Co., Boston, general contractor.

300 tons, three Washington state highway bridges, Adams County; bids to Olympia, Wash., March 4.

200 tons, concrete rib arch bridge, George Washington Memorial Parkway, Arlington, Va.; bids Feb. 27, Bureau of Public Roads, Arlington.

165 tons, high school, Arlington, Mass.; Poorvu Construction Co., Boston, general contractor.

160 tons, Washington state highway bridge, Skagit County; bids to Olympia, Wash., March 4.

140 tons, physics classroom building, Worcester Polytechnical Institute, Worcester, Mass.; J. B. Lowell Co., Worcester, general contractor.

125 tons, Washington state road projects, Whitman and Clark Counties; general contracts awarded.

100 tons or more, 394-ft Oregon state railroad overpass, Wasco County; bids to Portland, Oreg., Feb. 28.

100 tons, 170-ft Oregon state highway bridge, Polk County; bids to Portland, Oreg., Feb. 27.

45 tons, also gates, lifts, metal pipe, etc., Wasco earthfill dam; bids to the Bureau of Reclamation, Culver, Oreg., March 18.

PLATES . . .

PLATES PLACED

500 tons, liner and surge tank, Baker River, Washington State, power project, to Hydraulic Supply Mfg. Co., Seattle, by Stone & Webster Engineering Corp.

150 tons, water tank, Clinton, Okla., to the Pittsburgh-Des Moines Steel Co., Pittsburgh.

PLATES PENDING

1400 tons, tankwork, Northville Dock Co., Riverhead, N. Y.; bids asked.

950 tons, 5/16-in. water pipe; 36-in., also gates and valves; bids to Frank Kimsey Jr., city clerk, Anacortes, Wash., March 3; alternatives for concrete cylinder pipe; Carey & Kramer, Seattle, engineer.

250 tons, fuel storage tanks, Air Force Base, Amarillo, Tex.; bids late in February to U. S. Engineer, Tulsa, Okla.

200 tons, storage tanks, aircraft fueling facilities, Westover Air Force Base, Chicopee Falls, Mass.; bids in March, U. S. Engineer, Boston.

125 tons, carbon hull plates, General Stores Supply Office, Navy, Philadelphia; bids Feb. 18.

130 tons, fuel storage tank with double deck floating roof, Air Force Base, Duluth, Minn.; bids about March 18, U. S. Engineer, St. Paul.

125 tons, fuel storage tank, Sheppard Air Force Base, Wichita Falls, Tex.; bids mid-March, U. S. Engineer, Tulsa, Okla.

110 tons, fuel storage tanks, Loring Air Force Base, Maine; bids mid-March, U. S. Engineer, Boston.

110 tons, fuel storage tanks with pontoon type floating roof, Malmstrom Air Force Base, Great Falls, Mont.; bids about Feb. 28 to U. S. Engineer, Walla Walla, Wash.

Unstated, classified project at the Hanford Works, Washington State; bids in March.

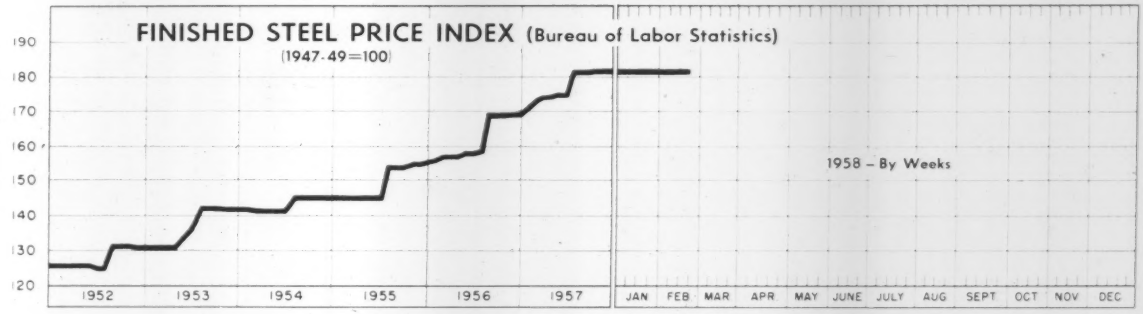
Unstated, 120 steel piles, reconstruction of Coast Guard pier, Ketchikan, Alaska; bids to Coast Guard, Juneau, Alaska, Feb. 25.

RAILS, CARS . . .

RAILROAD CARS PENDING

Alaska Railroad, six model St. 2 section cars; bids to the General Services Administration, Seattle, Feb. 28; early delivery required.

Price Indexes and Composites



Feb. 18, 1958	Week Ago	Month Ago	Jan. Avg.	Year Ago
181.8	181.8†	181.7	181.7	173.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Feb. 18

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.600	Bars, Reinforcing	6.210
Rails, Light, 40 lb	7.067	Bars, C.F., Carbon	10.360
Tie Plates	6.600	Bars, C.F., Alloy	13.875
Axles, Railway	9.825	Bars, C.F., Stainless, 302 (lb)	0.553
Wheels, Freight Car, 33 in. (per wheel)	60.000	Sheets, H.R., Carbon	6.192
Plates, Carbon	6.150	Sheets, C.R., Carbon	7.089
Structural Shapes	5.942	Sheets, Galvanized	8.270
Bars, Tool Steel, Carbon (lb)	0.535	Sheets, C.R., Stainless, 302 (lb)	0.688
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.650	Sheets, Electrical	12.025
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.355	Strip, C.R., Carbon	9.243
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.850	Strip, C.R., Stainless, 430 (lb)	0.493
Bars, H.R., Alloy	10.525	Strip, H.R., Carbon	6.245
Bars, H.R., Stainless, 303 (lb)	0.525	Pipe, Black, Buttweld (100 ft)	19.814
Bars, H.R., Carbon	6.425	Pipe, Galv., Buttweld (100 ft)	23.264
		Pipe, Line (100 ft)	199.023
		Casing, Oil Well, Carbon (100 ft)	194.499
		Casing, Oil Well, Alloy (100 ft)	304.610
Tubes, Boiler (100 ft)	49.130	Black Plate, Canmaking Quality (95 lb base box)	7.583
Tubing, Mechanical, Carbon (100 ft)	24.953	Wire, Drawn, Carbon	10.225
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608	Wire, Drawn, Stainless, 430 (lb)	0.653
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783	Bale Ties (bundles)	7.967
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483	Nails, Wire, 8d Common	9.828
		Wire, Barbed (80-rod spool)	8.719
		Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Feb. 19 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	239.15	239.15	239.15	227.10	181.31
Index in cents per lb	6.479	6.479	6.479	6.152	4.912

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$145.42	$145.42	$145.42	$139.60	$110.98
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	62.63	55.04
Basic Pig Iron, GT	65.99	65.99	65.99	62.18	54.66
Malleable Pig Iron, GT	67.27	67.27	67.27	63.41	55.77
Steelmaking Scrap, GT	37.17	37.67	34.25	52.83	43.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130. †Revised.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Feb. 19 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.425	5.075	3.95
Bars, H.R., Chicago	5.425	5.425	5.425	5.075	3.95
Bars, H.R., deld., Philadelphia	5.725	5.725	5.725	5.365	4.502
Bars, C.F., Pittsburgh	7.30*	7.30*	7.30*	6.85*	4.925
Shapes, Std., Pittsburgh	5.275	5.275	5.275	5.00	3.85
Shapes, Std., Chicago	5.275	5.275	5.275	5.00	3.85
Shapes, deld., Philadelphia	5.545	5.545	5.545	5.31	4.13
Plates, Pittsburgh	5.10	5.10	5.10	4.85	3.90
Plates, Chicago	5.10	5.10	5.10	4.85	3.90
Plates, Coatesville, Pa.	5.10	5.10	5.10	5.25	4.35
Plates, Sparrows Point, Md.	5.10	5.10	5.10	4.85	3.90
Plates, Claymont, Del.	5.10	5.10	5.10	5.70	4.35
Sheets, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.775
Sheets, H.R., Chicago	4.925	4.925	4.925	4.675	3.775
Sheets, C.R., Pittsburgh	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Chicago	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Detroit	6.05-6.15	6.05-6.15	6.05-6.15	5.75-5.85	4.775
Sheets, Galv., Pittsburgh	6.60	6.60	6.60	6.30	5.075
Strip, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.975-4.225
Strip, H.R., Chicago	4.925	4.925	4.925	4.675	3.725
Strip, C.R., Pittsburgh	7.15	7.15	7.15	6.85	5.10-5.80
Strip, C.R., Chicago	7.15	7.15	7.15	6.85	5.35
Strip, C.R., Detroit	7.25	7.25	7.25	6.95	5.30-6.05
Wire, Basic, Pittsburgh	7.65	7.65	7.65	7.20	5.475-5.225
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.49	6.35
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$10.30	$9.95	$8.95

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$96.00	$96.00	$96.00	$91.50	$70.50
Wire rods, $\frac{7}{32}$-$\frac{5}{8}$" Pitts.	6.15	6.15	6.15	5.80	4.425

PIG IRON, Gross Ton

	Feb. 19 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$63.50	$55.59
Basic, Valley	66.00	66.00	66.00	62.50	54.50
Basic, deld., Phila.	70.41	70.41	70.01	66.26	59.25
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.51	66.76	59.75
No. 2 Fdry, Birm.	62.50	62.50	62.50	59.00	51.38
No. 2 Fdry (Birm.) deld. Cin.	70.20	70.20	70.20	66.70	58.93
Malleable, Valley	66.50	66.50	66.50	63.00	55.00
Malleable, Chicago	66.50	66.50	66.50	63.00	55.00
Ferromanganese, Duquesne	245.00†	245.00†	245.00†	255.00†	228.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

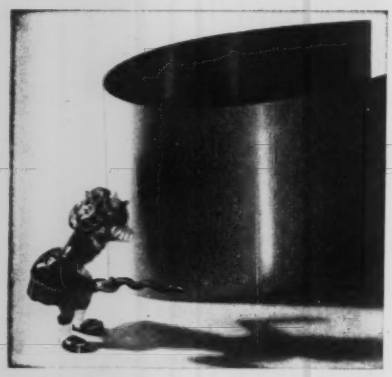
No. 1 Heavy Melt, Pittsburgh	$34.50	$35.50	$32.50	$53.50	$44.00
No. 1 Heavy Melt, E. Pa.	38.50	38.50	37.75	57.00	41.50
No. 1 Heavy Melt, Chicago	38.50	39.00	32.50	48.00	42.50
No. 1 Heavy Melt, Valley	37.50	37.50	30.50	53.50	44.00
No. 1 Heavy Melt, Cleve.	33.50	33.50	27.50	51.50	43.00
No. 1 Heavy Melt, Buffalo	28.50	28.50	28.50	53.50	43.00
Rails, Rerolling, Chicago	56.50	56.50	50.50	64.50	52.50
No. 1 Cast, Chicago	41.50	42.50	39.50	45.50	43.00

COKE, Net Ton

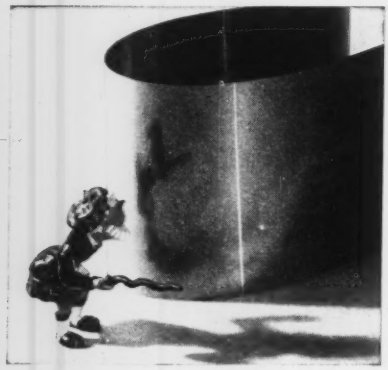
Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$15.00	$14.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.00	17.00

No matter which *FINISH* you like—you can buy it in

MicroRold® QUALITY STAINLESS STEEL



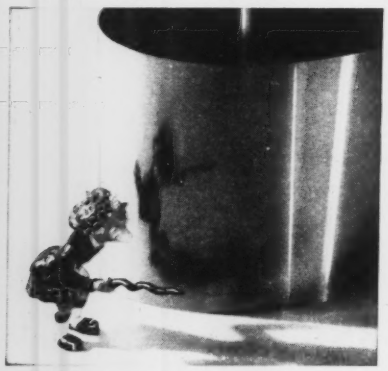
2D—A silvery white, but non-lustrous, surface produced by annealing and pickling cold reduced material. Steel sheets & strip in this condition are most ductile and the surface holds lubricant well for severe drawing operations.



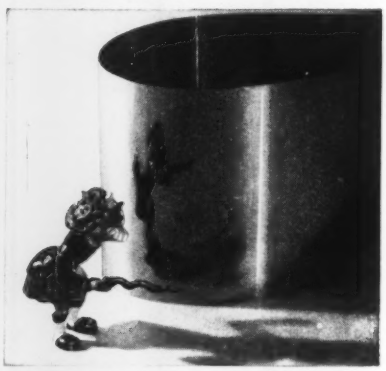
2B—Steel in the 2D condition which is subsequently rolled on a "skin pass" or temper mill. The surface acquires a bright finish from the polished rolls. This surface is somewhat more dense and hard than 2D and is a better starting surface for later finishing and buffing operations.

No. 3—This surface is made by grinding with a No. 100 abrasive. This surface is smooth but not as reflective as 2B.

No. 4—A finer finish than No. 3 made by grinding with a No. 150 abrasive. Like No. 3, this surface is easily blended with hand grinders after forming, drawing or welding.



No. 7—Good reflectivity and brilliance made by polishing with a No. 400 abrasive. This semi-mirror finish must be protected during fabrication by adhesive paper or strippable plastics lest the finish be marred beyond repair.



BRIGHT—A highly reflective surface made by cold reducing with highly polished, glass-hard rolls. This finish is only available in Type 430 stainless.

These are our standard surface finishes that are available in types 201, 202, 301, 302, 304 and 430 except Bright which is type 430 exclusively.

These finishes are regularly supplied in sheet and coil form in widths up to 48 inches.

Since Nos. 3, 4, 7 and 430 Bright are smooth reflective surfaces, they are not recommended for severe drawing without special precautions as the mill finish may be marred. Applications such as dairy machinery, kitchen and restaurant equipment and architectural decorative work require only local forming, so these highly polished surfaces are not greatly disturbed. All mill polished sheets are carefully packed to avoid handling imperfections. Protective adhesive paper can be specified by the buyer when needed.

For specific information on recommended surface characteristics for a particular stainless steel sheet and strip application, address your request to our Product Development Dept.

WASHINGTON STEEL CORPORATION — MicroRold® — STAINLESS SHEET & STRIP

Washington Steel *Corporation*

Producers of Stainless Sheet and Strip Exclusively

22-0 WOODLAND AVENUE, WASHINGTON, PA.

Steel Prices

Mill prices as reported to STEEL, Feb. 19, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 122; to footnotes, page 124.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ..... $73.50

INGOTS, Alloy (NT)
Detroit,S41 ..... $77.00
Farrell,Pa. S3 ..... 77.00
Lowellville,O. S3 ..... 77.00
Midland,Pa. C18 ..... 77.00
Munhall,Pa. U5 ..... 77.00
Sharon,Pa. S3 ..... 77.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ..... $77.50
Buffalo R2 ..... 77.50
Clairton,Pa. U5 ..... 77.50
Ensley,Ala. T2 ..... 77.50
Fairfield,Ala. T2 ..... 77.50
Fontana,Calif. K1 ..... 88.00
Gary,Ind. U5 ..... 77.50
Johnstown,Pa. B3 ..... 77.50
Lackawanna,N.Y. B2 ..... 77.50
Munhall,Pa. U5 ..... 77.50
Owensboro,Ky. G8 ..... 77.50
S.Chicago,Ill. R2, U5 ..... 77.50
S.Duquesne,Pa. U5 ..... 77.50
Sterling,Ill. N15 ..... 77.50
Youngstown R2 ..... 77.50

Carbon, Forging (NT)
Bessemer,Pa. U5 ..... $96.00
Buffalo R2 ..... 96.00
Canton,O. R2 ..... 98.50
Clairton,Pa. U5 ..... 96.00
Conshohocken,Pa. A3 ..... 101.00
Ensley,Ala. T2 ..... 96.00
Fairfield,Ala. T2 ..... 96.00
Fontana,Calif. K1 ..... 105.50
Gary,Ind. U5 ..... 96.00
Geneva,Utah C11 ..... 96.00
Houston S5 ..... 101.00
Johnstown,Pa. B2 ..... 96.00
Lackawanna,N.Y. B2 ..... 96.00
LosAngeles B3 ..... 105.50
Midland,Pa. C18 ..... 96.00
Munhall,Pa. U5 ..... 96.00
Owensboro,Ky. G8 ..... 96.00
Seattle B3 ..... 109.50
Sharon,Pa. S3 ..... 96.00
S.Chicago R2, U5, W14 ..... 96.00
S.Duquesne,Pa. U5 ..... 96.00
S.SanFrancisco B3 ..... 105.50
Warren,O. C17 ..... 96.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..... $114.00
Bridgeport,Conn. C32 ..... 114.00
Buffalo R2 ..... 114.00
Canton,O. R2, T7 ..... 114.00
Conshohocken,Pa. A3 ..... 121.00
Detroit S41 ..... 114.00
Economy,Pa. B14 ..... 114.00
Farrell,Pa. S3 ..... 114.00
Fontana,Calif. K1 ..... 135.00
Gary,Ind. U5 ..... 114.00
Houston S5 ..... 119.00
Ind.Harbor,Ind. Y1 ..... 114.00
Johnstown,Pa. B2 ..... 114.00
Lackawanna,N.Y. B2 ..... 114.00
LosAngeles B3 ..... 134.00
Lowellville,O. S3 ..... 114.00
Massillon,O. R2 ..... 114.00
Midland,Pa. C18 ..... 114.00
Munhall,Pa. U5 ..... 114.00
Owensboro,Ky. G8 ..... 114.00
Sharon,Pa. S3 ..... 114.00
S.Chicago R2,U5,W14 ..... 114.00
S.Duquesne,Pa. U5 ..... 114.00
Struthers,O. Y1 ..... 114.00
Warren,O. C17 ..... 114.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $117.50
Canton,O. R2 ..... 120.00
Cleveland R2 ..... 117.50
Gary,Ind. U5 ..... 117.50
S.Chicago,Ill. R2, W14 ..... 117.50
S.Duquesne,Pa. U5 ..... 117.50
Warren,O. C17 ..... 117.50

SKELP
Aliquippa,Pa. J5 ..... 5.075
Munhall,Pa. U5 ..... 4.875
Warren,O. R2 ..... 4.875
Youngstown R2, U5 ..... 4.875

WIRE RODS
AlabamaCity,Ala. R2 ..... 6.15
Aliquippa,Pa. J5 ..... 6.15
Alton,Ill. L1 ..... 6.35
Buffalo W12 ..... 6.15
Cleveland A7 ..... 6.15
Donora,Pa. A7 ..... 6.15
Fairfield,Ala. T2 ..... 6.15
Houston S5 ..... 6.40
IndianaHarbor,Ind. Y1 ..... 6.15
Johnstown,Pa. B2 ..... 6.15
Joliet,Ill. A7 ..... 6.15
KansasCity,Mo. S5 ..... 6.40
Kokomo,Ind. C16 ..... 6.25
LosAngeles B3 ..... 6.95
Minnequa,Colo. C10 ..... 6.40
Monessen,Pa. P7 ..... 6.15
N.Tonawanda,N.Y. B11 ..... 6.15
Pittsburg,Calif. C11 ..... 6.95
Portsmouth,O. P12 ..... 6.15
Roebling,N.J. R5 ..... 6.25
S.Chicago,Ill. R2 ..... 6.15
SparrowsPoint,Md. B2 ..... 6.25
Sterling,Ill.(1) N15 ..... 6.15
Sterling,Ill. N15 ..... 6.25
Struthers,O. Y1 ..... 6.15
Worcester,Mass. A7 ..... 6.45

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..... 5.275
Atlanta A11 ..... 5.475
Aliquippa,Pa. J5 ..... 5.275
Bessemer,Ala. T2 ..... 5.275
Bethlehem,Pa. B2 ..... 5.325
Birmingham C15 ..... 5.275
Clairton,Pa. U5 ..... 5.275
Fairfield,Ala. T2 ..... 5.275
Fontana,Calif. K1 ..... 6.075
Gary,Ind. U5 ..... 5.275
Geneva,Utah C11 ..... 5.275
Houston S5 ..... 5.375
Ind.Harbor,Ind. I-2 ..... 5.275
Johnstown,Pa. B2 ..... 5.325
Joliet,Ill. P22 ..... 5.275
KansasCity,Mo. S5 ..... 5.375
Lackawanna,N.Y. B2 ..... 5.325
LosAngeles B3 ..... 5.975
Minnequa,Colo. C10 ..... 5.575
Munhall,Pa. U5 ..... 5.275
Niles,Calif. P1 ..... 5.925
Phoenixville,Pa. P4 ..... 5.325
Portland,Oreg. O4 ..... 6.025
Seattle B3 ..... 6.025
S.Chicago,Ill. U5, W14 ..... 5.275
S.SanFrancisco B3 ..... 5.925
Sterling,Ill. N15 ..... 5.275
Torrance,Calif. C11 ..... 5.975
Weirton,W.Va. W6 ..... 5.275

Wide Flange
Bethlehem,Pa. B2 ..... 5.325
Clairton,Pa. U5 ..... 5.275
Fontana,Calif. K1 ..... 6.225
IndianaHarbor,Ind. I-2 ..... 5.275
Lackawanna,N.Y. B2 ..... 5.325
Munhall,Pa. U5 ..... 5.275
Phoenixville,Pa. P4 ..... 5.325
S.Chicago,Ill. U5 ..... 5.275

Alloy Std. Shapes
Aliquippa,Pa. J5 ..... 6.55
Clairton,Pa. U5 ..... 6.55
Gary,Ind. U5 ..... 6.55
Houston S5 ..... 6.65
KansasCity,Mo. S5 ..... 6.65
Munhall,Pa. U5 ..... 6.55
S.Chicago,Ill. U5 ..... 6.55

H.S., L.A. Std. Shapes
Aliquippa,Pa. J5 ..... 7.75
Bessemer,Ala. T2 ..... 7.75
Bethlehem,Pa. B2 ..... 7.80
Clairton,Pa. U5 ..... 7.75
Fairfield,Ala. T2 ..... 7.75
Fontana,Calif. K1 ..... 8.55
Gary,Ind. U5 ..... 7.75
Geneva,Utah C11 ..... 7.75
Houston S5 ..... 7.85
Ind.Harbor,Ind. I-2, Y1 ..... 7.75
Johnstown,Pa. B2 ..... 7.80
KansasCity,Mo. S5 ..... 7.85
Lackawanna,N.Y. B2 ..... 7.80
LosAngeles B3 ..... 8.45
Munhall,Pa. U5 ..... 7.75
Seattle B3 ..... 8.50
S.Chicago,Ill. U5, W14 ..... 7.75
S.SanFrancisco B3 ..... 8.40
Struthers,O. Y1 ..... 7.75

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 ..... 7.80
Lackawanna,N.Y. B2 ..... 7.80
Munhall,Pa. U5 ..... 7.75
S.Chicago,Ill. U5 ..... 7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ..... 5.325
Lackawanna,N.Y. B2 ..... 5.325
Munhall,Pa. U5 ..... 5.275
S.Chicago,Ill. U5 ..... 5.275

STEEL SHEET PILING
Lackawanna,N.Y. B2 ..... 6.225
Munhall,Pa. U5 ..... 6.225
S.Chicago,Ill. U5 ..... 6.225
Weirton,W.Va. W6 ..... 6.225

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..... 5.10
Aliquippa,Pa. J5 ..... 5.10
Ashland,Ky.(15) A10 ..... 5.10
Bessemer,Ala. T2 ..... 5.10
Clairton,Pa. U5 ..... 5.10
Claymont,Del. C22 ..... 5.10
Cleveland J5, R2 ..... 5.20
Coatesville,Pa. L7 ..... 5.10
Conshohocken,Pa. A3 ..... 5.20
Ecorse,Mich. G5 ..... 5.20
Fairfield,Ala. T2 ..... 5.10
Fontana,Calif.(30) K1 ..... 5.90
Gary,Ind. U5 ..... 5.10
Geneva,Utah C11 ..... 5.10
GraniteCity,Ill. G4 ..... 5.30
Harrisburg,Pa. P4 ..... 5.10
Houston S5 ..... 5.20
Ind.Harbor,Ind. I-2, Y1 ..... 5.10
Johnstown,Pa. B2 ..... 5.10
Lackawanna,N.Y. B2 ..... 5.10
LoneStar,Tex. L6 ..... 5.20
Mansfield,O. E6 ..... 5.10
Minnequa,Colo. C10 ..... 5.95
Munhall,Pa. U5 ..... 5.10
Newport,Ky. A2 ..... 5.10
Pittsburgh J5 ..... 5.10
Riverdale,Ill. A1 ..... 5.10
Seattle B3 ..... 6.00
Sharon,Pa. S3 ..... 5.10
S.Chicago,Ill. U5, W14 ..... 5.10
SparrowsPoint,Md. B2 ..... 5.10
Sterling,Ill. N15 ..... 5.10
Steubenville,O. W10 ..... 5.10
Warren,O. R2 ..... 5.10
Youngstown U5, Y1 ..... 5.10

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ..... 6.75
Fontana,Calif. K1 ..... 7.55
Geneva,Utah C11 ..... 6.75
Houston S5 ..... 6.85
Johnstown,Pa. B2 ..... 6.75
SparrowsPoint,Md. B2 ..... 6.75

PLATES, Wrought Iron
Economy,Pa. B14 ..... 13.15

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ..... 7.625
Bessemer,Ala. T2 ..... 7.625
Clairton,Pa. U5 ..... 7.625
Claymont,Del. C22 ..... 7.625
Cleveland J5, R2 ..... 7.625
Coatesville,Pa. L7 ..... 7.925
Conshohocken,Pa. A3 ..... 7.625
Economy,Pa. B14 ..... 7.625
Ecorse,Mich. G5 ..... 7.725
Fairfield,Ala. T2 ..... 7.625
Farrell,Pa. S3 ..... 7.625
Fontana,Calif.(30) K1 ..... 8.425
Gary,Ind. U5 ..... 7.625
Geneva,Utah C11 ..... 7.625
Houston S5 ..... 7.725
Ind.Harbor,Ind. I-2, Y1 ..... 7.625
Johnstown,Pa. B2 ..... 7.625
Munhall,Pa. U5 ..... 7.625
Pittsburgh J5 ..... 7.625
Seattle B3 ..... 8.525
Sharon,Pa. S3 ..... 7.625
S.Chicago,Ill. U5, W14 ..... 7.625
SparrowsPoint,Md. B2 ..... 7.625
Warren,O. R2 ..... 7.625
Youngstown U5 ..... 7.625

PLATES, ALLOY
Aliquippa,Pa. J5 ..... 7.20
Claymont,Del. C22 ..... 7.20
Coatesville,Pa. L7 ..... 7.20
Economy,Pa. B14 ..... 7.20
Fontana,Calif.(30) K1 ..... 8.00
Gary,Ind. U5 ..... 7.20
Houston S5 ..... 7.30
Ind.Harbor,Ind. Y1 ..... 7.20
Johnstown,Pa. B2 ..... 7.20
Lowellville,O. S3 ..... 7.20
Munhall,Pa. U5 ..... 7.20
Newport,Ky. A2 ..... 7.20
Pittsburgh J5 ..... 7.20
Seattle B3 ..... 8.10
Sharon,Pa. S3 ..... 7.20
S.Chicago,Ill. U5, W14 ..... 7.20
SparrowsPoint,Md. B2 ..... 7.20
Youngstown Y1 ..... 7.20

FLOOR PLATES
Cleveland J5 ..... 6.175
Conshohocken,Pa. A3 ..... 6.175
Ind.Harbor,Ind. I-2 ..... 6.175
Munhall,Pa. U5 ..... 6.175
S.Chicago,Ill. U5 ..... 6.175

PLATES, Ingot Iron
Ashland c.l.(15) A10 ..... 5.35
Ashland l.c.l.(15) A10 ..... 5.85
Cleveland c.l. R2 ..... 5.85
Warren,O. c.l. R2 ..... 5.85

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..... 5.425
Aliquippa,Pa.(9) J5 ..... 5.425
Alton,Ill. L1 ..... 5.625
Atlanta(9) A11 ..... 5.625
Bessemer,Ala.(9) T2 ..... 5.425
Birmingham(9) C15 ..... 5.425
Buffalo(9) R2 ..... 5.425
Clairton,Pa.(9) U5 ..... 5.425
Cleveland(9) R2 ..... 5.425
Ecorse,Mich.(9) G5 ..... 5.525
Emeryville,Calif. J7 ..... 6.175
Fairfield,Ala.(9) T2 ..... 5.425
Fairless,Pa.(9) U5 ..... 5.575
Fontana,Calif.(9) K1 ..... 6.125
Gary,Ind.(9) U5 ..... 5.425
Houston(9) S5 ..... 5.675
Ind.Harbor(9) I-2, Y1 ..... 5.425
Johnstown,Pa.(9) B2 ..... 5.425
Joliet,Ill. P22 ..... 5.425
KansasCity,Mo.(9) S5 ..... 5.675
Lackawanna(9) B2 ..... 5.425
LosAngeles(9) B3 ..... 6.125
Midland,Pa.(23) C18 ..... 5.725
Milton,Pa. M18 ..... 5.575
Minnequa,Colo. C10 ..... 5.875
Niles,Calif. P1 ..... 6.125
N.T'wanda,N.Y.(23)B11 5.775
Owensboro,Ky.(9) G8 ..... 5.425
Pittsburg,Calif.(9) C11 ..... 6.125
Pittsburgh(9) J5 ..... 5.425
Portland,Oreg. O4 ..... 6.175
Seattle B3, N14 ..... 6.175
S.Ch'c'go(9)R2,U5,W14 5.425
S.Duquesne,Pa.(9) U5 ..... 5.425
S.SanFran.,Calif.(9)B3 6.175
Sterling,Ill.(1)(9) N15 ..... 5.425
Sterling,Ill.(9) N15 ..... 5.525
Struthers,O. Y1 ..... 5.425
Tonawanda,N.Y. B12 ..... 5.425
Torrance,Calif.(9) C11 ..... 6.125
Youngstown(9) R2, U5 ..... 5.425

BARS, H.R. Leaded Alloy (Including leaded extra)
Warren,O. C17 ..... 7.475

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.475
Bethlehem,Pa. B2 ..... 6.475
Bridgeport,Conn. C32 ..... 6.55
Buffalo R2 ..... 6.475
Canton,O. R2, T7 ..... 6.475
Clairton,Pa. U5 ..... 6.475
Detroit S41 ..... 6.475
Economy,Pa. B14 ..... 6.475
Ecorse,Mich. G5 ..... 6.575
Fairless,Pa. U5 ..... 6.625
Farrell,Pa. S3 ..... 6.475
Fontana,Calif. K1 ..... 7.525
Gary,Ind. U5 ..... 6.475
Houston S5 ..... 6.725
Ind.Harbor,Ind. I-2, Y1 6.475
Johnstown,Pa. B2 ..... 6.475
KansasCity,Mo. S5 ..... 6.725
Lackawanna,N.Y. B2 ..... 6.475
Lowellville,O. S3 ..... 6.475
LosAngeles B3 ..... 7.525
Massillon,O. R2 ..... 6.475
Midland,Pa. C18 ..... 6.475
Owensboro,Ky. G8 ..... 6.475
Pittsburgh J5 ..... 6.475
Sharon,Pa. S3 ..... 6.475
S.Chicago R2, U5, W14 6.475
S.Duquesne,Pa. U5 ..... 6.475
Struthers,O. Y1 ..... 6.475
Warren,O. C17 ..... 6.475
Youngstown U5 ..... 6.475

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ..... 7.925
Bessemer,Ala. T2 ..... 7.925
Bethlehem,Pa. B2 ..... 7.925
Clairton,Pa. U5 ..... 7.925
Cleveland R2 ..... 7.925
Ecorse,Mich. G5 ..... 8.025
Fairfield,Ala. T2 ..... 7.925
Fontana,Calif. K1 ..... 8.625
Gary,Ind. U5 ..... 7.925
Houston S5 ..... 8.175
Ind.Harbor,Ind. Y1 ..... 7.925
Johnstown,Pa. B2 ..... 7.925
KansasCity,Mo. S5 ..... 8.175
Lackawanna,N.Y. B2 ..... 7.925
LosAngeles B3 ..... 8.625
Pittsburgh J5 ..... 7.925
Seattle B3 ..... 8.675
S.Chicago,Ill. U5, W14 ..... 7.925
S.Duquesne,Pa. U5 ..... 7.925
S.SanFrancisco B3 ..... 8.675
Struthers,O. Y1 ..... 7.925
Youngstown U5 ..... 7.925

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..... 5.575
Houston(9) S5 ..... 5.675
KansasCity,Mo.(9) S5 ..... 5.675
Lackawanna(9) B2 ..... 5.425
Sterling,Ill. N15 ..... 5.525
Sterling,Ill.(1) N15 ..... 5.425
Tonawanda,N.Y. B12 ..... 5.425

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 ..... 5.425
Atlanta A11 ..... 5.625
Joliet,Ill. P22 ..... 5.425
Niles,Calif. P1 ..... 6.125
Pittsburgh J5 ..... 5.425
Portland,Oreg. O4 ..... 6.175
SanFrancisco S7 ..... 6.275
Seattle B3 ..... 6.175

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.55
Clairton,Pa. U5 ..... 6.55
Gary,Ind. U5 ..... 6.55
Houston S5 ..... 6.80
KansasCity,Mo. S5 ..... 6.80
Pittsburgh J5 ..... 6.55
Youngstown U5 ..... 6.55

BARS, C.F., Leaded Alloy (Including leaded extra)
Ambridge,Pa. W18 ..... 9.925
BeaverFalls,Pa. M12 ..... 9.925
Camden,N.J. P13 ..... 10.10
Chicago W18 ..... 9.925
Cleveland C20 ..... 9.925*
Elyria,O. W8 ..... 9.925
LosAngeles P2, S30 ..... 11.40*
Monaca,Pa. S17 ..... 9.925
Newark,N.J. W18 ..... 10.10
SpringCity,Pa. K3 ..... 10.10
Warren,O. C17 ..... 9.925

*Grade A; add 0.50c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ..... 7.30
BeaverFalls,Pa. M12,R2 7.30
Birmingham C15 ..... 7.90
Bridgeport,Conn. C32 ..... 7.65
Buffalo B5 ..... 7.35
Camden,N.J. P13 ..... 7.75
Carnegie,Pa. C12 ..... 7.30
Chicago W18 ..... 7.30
Cleveland A7, C20 ..... 7.30
Detroit B5, P17 ..... 7.50
Detroit S41 ..... 7.30
Donora,Pa. A7 ..... 7.30
Elyria,O. W8 ..... 7.30
FranklinPark,Ill. N5 ..... 7.30
Gary,Ind. R2 ..... 7.30
GreenBay,Wis. F7 ..... 7.30
Hammond,Ind. J5, L2 ..... 7.30
Hartford,Conn. R2 ..... 7.80
Harvey,Ill. B5 ..... 7.30
LosAngeles(49) S30 ..... 8.75
LosAngeles P2, R2 ..... 8.75
Mansfield,Mass. B5 ..... 7.85
Massillon,O. R2, R8 ..... 7.30
Midland,Pa. C18 ..... 7.30
Monaca,Pa. S17 ..... 7.30
Newark,N.J. W18 ..... 7.75
NewCastle,Pa.(17) B4 ..... 7.30
Pittsburgh J5 ..... 7.30
Plymouth,Mich. P5 ..... 7.55
Putnam,Conn. W18 ..... 7.85
Readville,Mass. C14 ..... 7.85
S.Chicago,Ill. W14 ..... 7.30
SpringCity,Pa. K3 ..... 7.75
Struthers,O. Y1 ..... 7.30
Warren,O. C17 ..... 7.30
Willimantic,Conn. J5 ..... 7.80
Waukegan,Ill. A7 ..... 7.30
Youngstown F3, Y1 ..... 7.30

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19 6.55

BARS, Cold Finished Alloy
Ambridge,Pa. W18 ..... 8.775
BeaverFalls,Pa. M12,R2 8.775
Bethlehem,Pa. B2 ..... 8.775
Bridgeport,Conn. C32 ..... 8.925
Buffalo B5 ..... 8.775
Camden,N.J. P13 ..... 8.95
Canton,O. T7 ..... 8.775
Carnegie,Pa. C12 ..... 8.775
Chicago W18 ..... 8.775
Cleveland A7, C20 ..... 8.775
Detroit B5, P17 ..... 8.975
Detroit S41 ..... 8.775
Donora,Pa. A7 ..... 8.775
Elyria,O. W8 ..... 8.775
FranklinPark,Ill. N5 ..... 8.775
Gary,Ind. R2 ..... 8.775
GreenBay,Wis. F7 ..... 8.775
Hammond,Ind. J5, L2 ..... 8.775
Hartford,Conn. R2 ..... 9.075
Harvey,Ill. B5 ..... 8.775
Lackawanna,N.Y. B2 ..... 8.775
LosAngeles P2, S30 ..... 10.75
Mansfield,Mass. B5 ..... 9.075
Massillon,O. R2, R8 ..... 8.775
Midland,Pa. C18 ..... 8.775
Monaca,Pa. S17 ..... 8.775
Newark,N.J. W18 ..... 8.95
Plymouth,Mich. P5 ..... 8.975
S.Chicago,Ill. W14 ..... 8.775
SpringCity,Pa. K3 ..... 8.95
Struthers,O. Y1 ..... 8.775
Warren,O. C17 ..... 8.775
Waukegan,Ill. A7 ..... 8.775
Worcester,Mass. A7 ..... 9.075
Youngstown F3, Y1 ..... 8.775

BARS, Reinforcing (To Fabricators)

AlabamaCity,Ala. R2 ..5.425
Atlanta A11 .....5.625
Birmingham C15 .....5.425
Buffalo R2 .....5.425
Cleveland R2 .....5.425
Ecorse,Mich. G5 .....5.775
Emeryville,Calif. J7 ..6.175
Fairfield,Ala. T2 ....5.425
Fairless,Pa. U5 .....5.575
Fontana,Calif. K1 ....6.125
Ft.Worth,Tex.(4)(26)T4 5.875
Gary,Ind. U5 .....5.425
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1 5.425
Johnstown,Pa. B2 ....5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo. S5 ...5.675
Lackawanna,N.Y. B2 ..5.425
LosAngeles B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ..5.875
Niles,Calif. P1 .....6.125
Pittsburg,Calif. C11 ..6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 ....6.175
SandSprings,Okla. S5 ..5.925
Seattle B3, N14 .....6.175
S.Chicago,Ill. R2 .....5.425
S.Duquesne,Pa. U5 ....5.425
S.SanFrancisco B3 ....6.175
SparrowsPoint,Md. B2 .5.425
Sterling,Ill.(1) N15 ..5.425
Sterling,Ill. N15 .....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..6.00
Torrance,Calif. C11 ..6.125
Youngstown R2, U5 ..5.425

BARS, Reinforcing (Fabricated; to Consumers)

Boston B2, U8 .....7.65
Chicago U8 .....6.91
Cleveland U8 .....6.89
Johnstown,Pa. B2 ....7.08
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..6.85
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.55
Philadelphia U8 .....7.38
Pittsburgh J5, U8 .....7.10
Seattle B3, N14 .....7.70
SparrowsPt.,Md. B2 ..7.08
St.Paul U8 .....7.92
Williamsport,Pa. S19 ..7.00

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 14.45
Economy,Pa.(D.R.)B14 18.00
Economy,(Staybolt)B14 18.45

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2..5.325
ChicagoHts.(4)(44) I-2 .5.425
ChicagoHts.(4) C2 ....5.425
Franklin,Pa. (3) F5 ..5.325
Franklin,Pa. (4) F5 ..5.425
JerseyShore,Pa.(3) J8 ..5.30
Marion,O. (3) P11 ....5.325
Tonawanda(3) B12 ...5.325
Tonawanda(4) B12 ....6.00
Williamsport,Pa.(3) S19 5.50

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..4.925
Allenport,Pa. P7 .....4.925
Ashland,Ky.(8) A10 ..4.925
Cleveland J5, R2 .....4.925
Conshohocken,Pa. A3 ..4.975
Detroit(8) M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 .....4.925
Fairless,Pa. U5 .....4.975
Fontana,Calif. K1 ....5.675
Gary,Ind. U5 .....4.925
Geneva,Utah C11 .....5.025
GraniteCity,Ill(8) G4 ..5.125
Ind.Harbor,Ind. I-2, Y1 4.925
Irvin,Pa. U5 .....4.925
Lackawanna,N.Y. B2 ..4.925
Mansfield,O. E6 .....4.925
Munhall,Pa. U5 .....4.925
Newport,Ky.(8) A2 ...4.925
Niles,O. M21, S3 .....4.925
Pittsburg,Calif. C11 ..5.625
Pittsburgh J5 .....4.925
Portsmouth,O. P12 ....4.925
Riverdale,Ill. A1 .....4.925
Sharon,Pa. S3 .....4.925
S.Chicago,Ill. W14 ....4.925
SparrowsPoint,Md. B2 ..4.925
Steubenville,O. W10 ..4.925
Warren,O. R2 .....4.925
Weirton,W.Va. W6 ...4.925
Youngstown U5, Y1 ..4.925

SHEETS, H.R.(19) Ga. & Lighter)

Niles,O. M21 .....6.05

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.10
Ind.Harbor,Ind. Y1 ....8.10
Irvin,Pa. U5 .....8.10
Munhall,Pa. U5 .....8.10
Newport,Ky. A2 .....8.10
Youngstown U5, Y1 ..8.10

SHEETS, H.R.(14 Ga. & Heavier) High-Strength, Low-Alloy

Cleveland J5, R2 ....7.275
Conshohocken,Pa. A3 ..7.325
Ecorse,Mich. G5 .....7.375
Fairfield,Ala. T2 .....7.275
Fairless,Pa. U5 .....7.325
Farrell,Pa. S3 .....7.275
Fontana,Calif. K1 ....8.025
Gary,Ind. U5 .....7.275
Ind.Harbor,Ind. I-2, Y1 7.275
Irvin,Pa. U5 .....7.275
Lackawanna (35) B2 ..7.275
Munhall,Pa. U5 .....7.275
Pittsburgh J5 .....7.275
S.Chicago,Ill. U5, W14 7.275
Sharon,Pa. S3 .....7.275
SparrowsPoint(36) B2 .7.275
Warren,O. R2 .....7.275
Weirton,W.Va. W6 ...7.275
Youngstown U5, Y1 ..7.275

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.675
Warren,O. R2 .....5.675

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.80
Middletown,O. A10 ....6.55
Warren,O. R2 .....6.80

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.05
Allenport,Pa. P7 .....6.05
Cleveland J5, R2 .....6.05
Conshohocken,Pa. A3 ..6.10
Detroit M1 .....6.05
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....6.05
Fairless,Pa. U5 .....6.10
Follansbee,W.Va. F4 ..6.05
Fontana,Calif. K1 ....7.30
Gary,Ind. U5 .....6.05
GraniteCity,Ill. G4 ....6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 .....6.05
Lackawanna,N.Y. B2 ..6.05
Mansfield,O. E6 .....6.05
Middletown,O. A10 ....6.05
Newport,Ky. A2 .....6.05
Pittsburg,Calif. C11 ....7.00
Pittsburgh J5 .....6.05
Portsmouth,O. P12 ....6.05
SparrowsPoint,Md. B2 ..6.05
Steubenville,O. W10 ....6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 ....6.05
Yorkville,O. W10 .....6.05
Youngstown Y1 .....6.05

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 ....8.975
Ecorse,Mich. G5 .....9.075
Fairless,Pa. U5 .....9.025
Fontana,Calif. K1 ....10.275
Gary,Ind. U5 .....8.975
IndianaHarbor,Ind. Y1 8.975
Irvin,Pa. U5 .....8.975
Lackawanna(37) B2 ..8.975
Pittsburgh J5 .....8.975
SparrowsPoint (38) B2 8.975
Warren,O. R2 .....8.975
Weirton,W.Va. W6 ...8.975
Youngstown Y1 .....8.975

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	.6.95	7.20
Canton,O. R2	.6.95	7.45
Fairfield T2	.6.95	7.20
Gary,Ind. U5	.6.95	7.20
GraniteCity,Ill. G4	7.15	...
Ind.Harbor I-2	.6.95	7.20
Irvin,Pa. U5	.6.95	7.20
Kokomo,Ind. C16	.7.05	...
MartinsFry. W10	.6.95	7.20
Pitts.,Calif. C11	..7.70	...
Pittsburgh J5	.6.95	...
SparrowsPt. B2	..6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ..7.20

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2 ..6.60‡
Ashland,Ky. A10 ....6.60†
Canton,O. R2 .....6.60‡
Dover,O. E6 .....6.60†
Fairfield,Ala. T2 .....6.60†
Gary,Ind. U5 .....6.60*
GraniteCity,Ill. G4 ....6.80*
Ind.Harbor,Ind. I-2 ...6.60†
Irvin,Pa. U5 .....6.60*
Kokomo,Ind. C16 ....6.70‡
MartinsFerry,O. W10 ..6.60*
Middletown,O. A10 ....6.60†
Pittsburg,Calif. C11 ...7.35*
Pittsburgh J5 .....6.60†
SparrowsPt.,Md. B2 ..6.60†
Warren,O. R2 .....6.60†
Weirton,W.Va. W6 ....6.60*

*Continuous and noncontinuous .†Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana, Calif. K1 ... 7.175

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....9.725
SparrowsPt.(39) B2 ..9.725

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.00
Irvin,Pa. U5 .....7.00

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....6.85
Middletown,O. A10 ....6.85

SHEETS, Electrogalvanized

Cleveland (28) R2 ....7.425
Niles,O. (28) R2 ....7.425
Youngstown J5 .....7.275
Weirton,W.Va. W6 ..7.275

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .9.25
Butler,Pa. A10 (type 2) .9.35

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.625
Cleveland R2 .....6.625
Gary,Ind. U5 .....6.625
GraniteCity,Ill. G4 ....6.825
Ind.Harbor,Ind. I-2, Y1 6.625
Irvin,Pa. U5 .....6.625
Middletown,O. A10 ....6.625
Niles,O. M21, S3 ....6.625
Youngstown Y1 .....6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ..8.65
Ind.Harbor,Ind. I-2 ..8.475
Yorkville,O. W10 ....8.475

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	7.00
Gary,Ind. U5	7.00
Mansfield,O. E6	7.00
Middletown,O. A10	7.00
Niles,O. M21, R2, S3	7.00
Weirton,W.VA. W6	7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.40

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D3 Dearborn Div., Sharon Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md.Fine & Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W.Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Div., H. K. Porter Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ..4.925
Allenport,Pa. P7 .....4.925
Alton,Ill. L1 .....5.125
Ashland,Ky.(8) A10 ...4.925
Atlanta A11 .....5.125
Bessemer,Ala. T2 .....4.925
Birmingham C15 .....4.925
Buffalo(27) R2 .....4.925
Conshohocken,Pa. A3 ..4.975
Detroit M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 .....4.925
Fontana,Calif. K1 .....5.675
Gary,Ind. U5 .....4.925
Ind.Harbor,Ind. I-2, Y1 4.925
Johnstown,Pa.(25) B2 ..4.925
Lackaw'na,N.Y.(25) B2 4.925
LosAngeles(25) B3 ....5.675
Minnequa,Colo. C10 ...6.025
Riverdale,Ill. A1 .....4.925
SanFrancisco S7 .....6.35
Seattle(25) B3 .....5.925
Seattle N14 .....6.35
Sharon,Pa. S3 .....4.925
S.Chicago W14 .....4.925
S.SanFrancisco(25) B3 5.675
SparrowsPoint,Md. B2 4.925
Sterling,Ill.(1) N15 ...4.925
Sterling,Ill. N15 .....5.025
Torrance,Calif. C11 ...5.675
Warren,O. R2 .....4.925
Weirton,W.Va. W6 ...4.925
Youngstown U5 .....4.925

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.10
Farrell,Pa. S3 .....8.10
Gary,Ind. U5 .....8.10
Houston S5 .....8.35
Ind.Harbor,Ind. Y1 .....8.10
KansasCity,Mo. S5 .....8.35
LosAngeles B3 .....9.30
Lowellville,O. S3 .....8.10
Newport,Ky. A2 .....8.10
Sharon,Pa. A2, S3 .....8.10
S.Chicago,Ill. W14 .....8.10
Youngstown U5, Y1 ....8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2 .....7.325
Conshohocken,Pa. A3 ..7.325
Ecorse,Mich. G5 .....7.425
Fairfield,Ala. T2 .....7.325
Farrell,Pa. S3 .....7.325
Gary,Ind. U5 .....7.325
Ind.Harbor,Ind. I-2, Y1 7.325
Lackawanna,N.Y. B2 ..7.325
LosAngeles(25) B3 ....8.075
Seattle(25) B3 .....8.325
Sharon,Pa. S3 .....7.325
S.Chicago,Ill. W14 ....7.325
S.SanFrancisco(25) B3 .8.075
SparrowsPoint,Md. B2 ..7.325
Warren,O. R2 .....7.325
Weirton,W.Va. W6 ....7.325
Youngstown U5, Y1 ..7.325

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...5.175
Warren,O. R2 .....5.675

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.15
Baltimore T6 .....7.15
Boston T6 .....7.70
Buffalo S40 .....7.15
Cleveland A7, J5 .....7.15
Conshohocken,Pa. A3 ..7.20
Dearborn,Mich. D3 .....7.25
Detroit D2, M1, P20 ..7.25
Dover,O. G6 .....7.15
Ecorse,Mich. G5 .....7.25
Evanston,Ill. M22 .....7.25
Follansbee,W.Va. F4 ...7.15
Fontana,Calif. K1 .....9.00
FranklinPark,Ill. T6 ...7.25
Ind.Harbor,Ind. Y1 ....7.15
Indianapolis J5 .....7.30
LosAngeles J5 .....9.05
LosAngeles C1 .....9.20
NewBedford,Mass. R10 .7.60
NewBritain(10) S15 ....7.15
NewCastle,Pa. B4, E5 ..7.15
NewHaven,Conn. D2 ...7.60
NewKensington,Pa. A6..7.15
Pawtucket,R.I. R3 .....7.80
Pawtucket,R.I. N8 .....7.70
Philadelphia P24 .....7.70
Pittsburgh J5 .....7.15
Riverdale,Ill. A1 .....7.25
Rome,N.Y.(32) R6 .....7.15
Sharon,Pa. S3 .....7.15
Trenton,N.J.(31) R5....8.60
Wallingford,Conn. W2 ..7.60
Warren,O. R2, T5 .....7.15
Weirton,W.Va. W6 .....7.15
Worcester,Mass. A7 ....7.70
Youngstown J5, Y1 ....7.15

STRIP, Cold-Rolled Alloy

Boston T6 .....15.40
Carnegie,Pa. S18 .....15.05
Cleveland A7 .....15.05
Dover,O. G6 .....15.05
Farrell,Pa. S3 .....15.05
FranklinPark,Ill. T6 ..15.05
Harrison,N.J. C18 .....15.05
Indianapolis J5 .....15.20
Lowellville,O. S3 .....15.05
Pawtucket,R.I. N8 .....15.40
Riverdale,Ill. A1 .....15.05
Sharon,Pa. S3 .....15.05
Worcester,Mass. A7 ...15.35
Youngstown J5 .....15.05

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.45
Dearborn,Mich. D3 ....10.60
Dover,O. G6 .....10.45
Ecorse,Mich. G5 .....10.60
Farrell,Pa. S3 .....10.50
Ind.Harbor,Ind. Y1 ...10.65
Sharon,Pa. S3 .....10.50
Warren,O. R2 .....10.45
Weirton,W.Va. W6 ....10.50
Youngstown Y1 .....10.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....7.90

STRIP, C.R. Electrogalvanized

Cleveland A7 .....7.15*
Dover,O. G6 .....7.15*
Evanston,Ill. M22 .....7.25*
Riverdale,Ill. A1 .....7.25*
Warren,O. B9, T5 .....7.15*
Worcester,Mass. A7 ...7.70*
Youngstown J5 .....7.15*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....7.275

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.65
Riverdale,Ill. A1 .....5.50
Sharon,Pa. S3 .....5.35
Youngstown U5 .....5.35

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. D3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	...	....	12.90	16.10	19.30
Indianapolis J5	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles J5	11.15	12.60	14.80	....	....
NewBritain,Conn.(10) S15	8.95	10.40	12.60	15.60	18.55
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	16.10	19.30
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown J5	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.10	21.95	26.30
Buffalo W12	18.10	....	....
Fostoria,O. S1	18.30	22.15	....
FranklinPark,Ill. T6	18.45	22.30	26.65
Harrison,N.J. C18	18.10	21.95	26.30
New York W3	18.10	21.95	26.30
Palmer,Mass. W12	18.10	....	....
Trenton,N.J. R5	18.10	21.95	26.30
Worcester,Mass. A7, T6	18.10	21.95	26.30
Youngstown J5	18.45	22.30	26.65

SILICON STEEL

H.R.SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	11.80	12.90	13.95
Mansfield,O. E6	9.625	11.10	11.80	12.90	13.95
Newport,Ky. A2	9.625	11.10	11.80	12.90	13.95
Niles,O. M21, S3	9.625	11.10	11.80	12.90	....
Vandergrift,Pa. U5	....	11.10	11.80	12.90	13.95
Warren,O. R2	9.625	11.10	11.80	12.90	....
Zanesville,O. A10	....	11.10	11.80	12.90	13.95

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.35	12.05	13.15	14.20
Brackenridge,Pa. A4	....	....	12.05	13.15	14.20
GraniteCity,Ill. G4	9.825*	11.05*	11.75*	12.85*	....
IndianaHarbor,Ind. I-2	9.625†	10.85*	11.55*	12.65*	....
Mansfield,O. E6	9.625*	11.35	12.05	13.15	14.20
Vandergrift,Pa. U5	9.625*	11.35	12.05	13.15	14.20
Warren,O. R2	9.625*	11.35	12.05	13.15	14.20
Zanesville,O. A10	....	11.35†	12.05	13.15	14.20
					Stator
Vandergrift,Pa. U5	....	....	....	....	7.85

H.R. SHEETS (22 Ga., cut lengths)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.00	15.55	16.05	17.10
Vandergrift,Pa. U5	15.00	15.55	16.05	17.10
Zanesville,O. A10	15.00	15.55	16.05	17.10

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	17.60	19.20	19.70	20.20	15.25††
Butler,Pa. A10	....	....	19.20	19.70	20.20	....
Vandergrift,Pa. U5	16.60	17.60	19.20	19.70	20.20	15.25**
Warren,O. R2	....	....	....	....	....	15.25‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower. ††Coils only.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40
ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	7.725	7.925	....
Niles,O. R2	7.725	7.925	8.125

TIN PLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa.J5	$10.05	$10.30
Fairfield,Ala. T2	10.15	10.40
Fairless,Pa. U5	10.15	10.40
Fontana,Calif. K1	10.80	11.05
Gary,Ind. U5	10.05	10.30
Irvin,Pa. U5	10.05	10.30
Pitts.,Calif. C11	10.80	11.05
Sp.Pt.,Md. B2	10.15	10.40
Weirton,W.Va.W6	10.05	10.30
Yorkville,O. W10	10.05	10.30

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$7.85
Fairfield,Ala. T2 .....7.95
Fairless,Pa. U5 .....7.95
Fontana,Calif. K1 .....8.60
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. I-2,Y1 ..7.85
Irvin,Pa. U5 .....7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5 .....$7.50
Gary,Ind. U5 .....7.50
GraniteCity,Ill. G4 .....7.60
Ind.Harbor,Ind. Y1 .....7.50
Irvin,Pa. U5 .....7.50
Yorkville,O. W10 .....7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5 .....$9.70
Irvin,Pa. U5 .....9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind. U5 .....$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..7.65
Aliquippa,Pa. J5 .....7.65
Alton,Ill. L1 .....7.85
Atlanta A11 .....7.85
Bartonville,Ill. K4 .....7.75
Buffalo W12 .....7.65
Chicago W13 .....7.65
Cleveland A7, C20 .....7.65
Crawfordsville,Ind. MS..7.75
Donora,Pa. A7 .....7.65
Duluth A7 .....7.65
Fairfield,Ala. T2 .....7.65
Fostoria,O.(24) S1 .....7.75
Houston S5 .....7.90
Jacksonville,Fla. M8 ...8.00
Johnstown,Pa. B2 .....7.65
Joliet,Ill. A7 .....7.65
KansasCity,Mo. S5 .....7.90
Kokomo,Ind. C16 .....7.75
LosAngeles B3 .....8.60
Minnequa,Colo. C10 ....7.90
Monessen,Pa. P7, P16..7.65
N.Tonawanda,N.Y. B11.7.65
Palmer,Mass. W12 .....7.95
Pittsburg,Calif. C11 ....8.60
Portsmouth,O. P12 .....7.65
Rankin,Pa. A7 .....7.65
S.Chicago,Ill. R2 .....7.65
S.SanFrancisco C10 ....8.60
SparrowsPoint,Md. B2 ..7.75
Sterling,Ill.(1) N15 ....7.65
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....7.65
Waukegan,Ill. A7 .....7.65
Worcester,Mass. A7 ....7.95

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....12.65
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....12.65
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P16 ....12.65
Muncie,Ind. I-7 .....12.85
NewHaven,Conn. A7 ..12.95
Palmer,Mass. W12 ....12.95
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 .....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ..12.75
Struthers,O. Y1 .....12.65
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.30
Alton,Ill. L1 .....9.50
Buffalo W12 .....9.30
Cleveland A7 .....9.30
Donora,Pa. A7 .....9.30
Duluth A7 .....9.30
Johnstown,Pa. B2 .....9.30
KansasCity,Mo. S5 .....9.55
LosAngeles B3 .....10.25
Minnequa,Colo. C10 ....9.50
Monessen,Pa. P7, P16 ..9.30
NewHaven,Conn. A7 ....9.60
Palmer,Mass. W12 .....9.60
Pittsburg,Calif. C11 ...10.25
Portsmouth,O. P12 .....9.30
Roebling,N.J. R5 .....9.60
S.Chicago,Ill. R2 .....9.30
S.SanFrancisco C10 ...10.25
SparrowsPt.,Md. B2 ....9.40
Struthers,O. Y1 .....9.30
Trenton,N.J. A7 .....9.60
Waukegan,Ill. A7 .....9.30
Worcester,Mass. A7 ....9.60

WIRE, M8 Spring, High-Carbon

Aliquippa,Pa. J5 .....9.30
Alton,Ill. L1 .....9.50
Bartonville,Ill. K4 .....9.40
Buffalo W12 .....9.30
Cleveland A7 .....9.30
Donora,Pa. A7 .....9.30
Duluth A7 .....9.30
Fostoria,O. S1 .....9.35
Johnstown,Pa. B2 .....9.30
KansasCity,Mo. S5 .....9.55
LosAngeles B3 .....10.25
Milbury,Mass.(12) N6 ..9.60
Minnequa,Colo. C10 ....9.50
Monessen,Pa. P7, P16..9.30
Muncie,Ind. I-7 .....9.50
Palmer,Mass.(12) W12..9.60
Pittsburg,Calif. C11 ...10.25
Portsmouth,O. P12 .....9.30
Roebling,N.J. R5 .....9.60
S.Chicago,Ill. R2 .....9.30
S.SanFrancisco C10 ...10.25
SparrowsPt.,Md. B2 ....9.40
Struthers,O. Y1 .....9.30
Trenton,N.J. A7 .....9.60
Waukegan,Ill. A7 .....9.30
Worcester A7, J4, T6...9.60

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1 .....15.80
Bartonville,Ill. K4 .....15.70
Buffalo W12 .....15.60
Chicago W13 .....15.60
Cleveland A7 .....15.60
Crawfordsville,Ind. MS.15.70
Fostoria,O. S1 .....15.60
Houston S5 .....15.85
Jacksonville,Fla. M8 ..15.95
Johnstown,Pa. B2 .....15.60
KansasCity,Mo. S5 .....15.85
Kokomo,Ind. C16 .....15.60
Minnequa,Colo. C10 ...15.85
Monessen,Pa. P7, P16..15.60
Muncie,Ind. I-7 .....15.80
Palmer,Mass. W12 ....15.90
S.SanFrancisco C10 ...16.45
Waukegan,Ill. A7 .....15.60
Worcester,Mass. A7, T6 15.90

ROPE WIRE (A)

Bartonville,Ill. K4 ....12.75
Buffalo W12 .....12.75
Fostoria,O. S1 .....12.75
Johnstown,Pa. B2 .....12.75
Monessen,Pa. P7 .....12.75
Muncie,Ind. I-7 .....12.95
Palmer,Mass. W12 ....13.05
Portsmouth,O. P12 ....12.75
Roebling,N.J. R5 .....13.05
SparrowsPt.,Md. B2 ..12.85
Struthers,O. Y1 .....12.75
Worcester,Mass. J4 ....13.05
(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Tire Bead

Bartonville,Ill. K4	16.55
Monessen,Pa. P16	16.55
Roebling,N.J. R5	17.05

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	11.65
Baltimore T6	11.95
Boston T6	11.95
Buffalo W12	11.65
Chicago W13	11.75
Cleveland A7	11.65
Crawfordsville,Ind. M8	11.65
Dover,O. G6	11.65
Fostoria,O. S1	11.65
FranklinPark,Ill. T6	11.75
Kokomo,Ind. C16	11.65
Massillon,O. R8	11.65
Milwaukee C23	11.85
Monessen,Pa. P7, P16	11.65
Palmer,Mass. W12	11.95
Pawtucket,R.I. N8	11.95
Philadelphia P24	11.95
Riverdale,Ill. A1	11.75
Rome,N.Y. R6	11.65
Sharon,Pa. S3	11.65
Trenton,N.J. R5	11.95
Warren,O. B9	11.65
Worcester,Mass. A7, T6	11.95

NAILS, Stock

	Col.
AlabamaCity,Ala. R2	.173
Aliquippa,Pa. J5	.173
Atlanta A11	.175
Bartonville,Ill. K4	.175
Chicago W13	.173
Cleveland A9	.173
Crawfordsville,Ind. M8	.175
Donora,Pa. A7	.173
Duluth A7	.173
Fairfield,Ala. T2	.173
Houston S5	.178
Jacksonville,Fla.(20) MS	.184
Johnstown,Pa. B2	.173
Joliet,Ill. A7	.173
KansasCity,Mo. S5	.178
Kokomo,Ind. C16	.175
Minnequa,Colo. C10	.178
Monessen,Pa. P7	.173
Pittsburg,Calif. C11	.192
Rankin,Pa. A7	.173
S.Chicago,Ill. R2	.173
SparrowsPt.,Md. B2	.175
Sterling,Ill.(7) N15	.175
Worcester,Mass. A7	.179

(To Wholesalers; per cwt)

Galveston,Tex. D7	$9.10

NAILS, Cut (100 lb keg)
To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	.175
Aliquippa,Pa. J5	.175
Atlanta A11	.177
Bartonville,Ill. K4	.177
Crawfordsville,Ind. M8	.177
Donora,Pa. A7	.175
Duluth A7	.175
Fairfield,Ala. T2	.175
Houston S5	.180
Jacksonville,Fla.(20) MS	186
Johnstown,Pa. B2	.175
Joliet,Ill. A7	.175
KansasCity,Mo. S5	.180
Kokomo,Ind. C6	.177
Minnequa,Colo. C10	.180
Pittsburg,Calif. C11	.194
Rankin,Pa. A7	.175
S.Chicago,Ill. R2	.175
SparrowsPt.,Md. B2	.177
Sterling,Ill.(7) N15	.175
Worcester,Mass. A7	.181

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)
Coil No. 3150

AlabamaCity,Ala. R2	$10.26
Atlanta A11	10.36
Bartonville,Ill. K4	10.36
Buffalo W12	10.26
Chicago W13	10.26
Crawfordsville,Ind. M8	10.36
Donora,Pa. A7	10.26
Duluth A7	10.26
Fairfield,Ala. T2	10.26
Houston S5	10.51
Jacksonville,Fla. MS	10.82
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	10.26
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	10.36
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	11.04
S.Chicago,Ill. R2	10.26
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill.(37) N15	10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$10.60
Atlanta A11	10.70
Bartonville,Ill. K4	10.70
Buffalo W12	10.60
Chicago W13	10.60
Crawfordsville,Ind. M8	10.70
Donora,Pa. A7	10.60
Duluth A7	10.60
Fairfield,Ala. T2	10.60
Houston S5	10.85
Jacksonville,Fla. MS	11.16
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	10.60
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	10.70
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	10.60
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill.(37) N15	10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$10.65
Atlanta A11	10.75
Bartonville,Ill. K4	10.75
Buffalo W12	10.65
Chicago W13	10.65
Crawfordsville,Ind. M8	10.75
Donora,Pa. A7	10.65
Duluth A7	10.65
Fairfield,Ala. T2	10.65
Houston S5	10.90
Jacksonville,Fla. MS	11.21
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	10.65
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	10.75
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	11.45
S.Chicago,Ill. R2	10.65
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill.(37) N15	10.75

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	.212
Atlanta A11	.214
Bartonville,Ill. K4	.214
Crawfordsville,Ind. M8	.214
Donora,Pa. A7	.212
Duluth A7	.212
Fairfield,Ala. T2	.212
Houston S5	.217
Jacksonville,Fla. MS	.219
Joliet,Ill. A7	.212
KansasCity,Mo. S5	.217
Kokomo,Ind. C16	.214
Minnequa,Colo. C10	.217
Pittsburg,Calif. C11	.236
S.SanFrancisco C10	.236
SparrowsPt.,Md. B2	.214
Sterling,Ill.(7) N15	.214

FENCE POSTS

Birmingham C15	.172
ChicagoHts.,Ill. C2, I-2	.172
Duluth A7	.172
Franklin,Pa. F5	.172
Huntington,W.Va. C15	.172
Johnstown,Pa. B2	.172
Marion,O. P11	.172
Minnequa,Colo. C10	.177
Sterling,Ill.(1) N15	.172
Tonawanda,N.Y. B12	.174

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.193••
Aliquippa,Pa. J5	.190§
Atlanta A11	.198•
Bartonville,Ill. K4	.198
Crawfordsville,Ind. M8	.198
Donora,Pa. A7	.193†
Duluth A7	.193†
Fairfield,Ala. T2	.193†
Houston S5	.198••
Jacksonville,Fla. MS	.203
Johnstown,Pa. B2	.196§
Joliet,Ill. A7	.193†
KansasCity,Mo. S5	.198••
Kokomo,Ind. C16	.195†
Minnequa,Colo. C10	.198••
Monessen,Pa. P7	.196•
Pittsburg,Calif. C11	.213†
Rankin,Pa. A7	.193†
S.Chicago,Ill. R2	.193••
S.SanFrancisco C10	.213••
SparrowsPoint,Md. B2	.198§
Sterling,Ill.(7) N15	.198††

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	.187••
Aliq'ppa,Pa.9-14½ga.J5	190§
Atlanta A11	.192•
Bartonville,Ill. K4	.192
Crawfordsville,Ind. M8	.192
Donora,Pa. A7	.187†
Duluth A7	.187†
Fairfield,Ala. T2	.187†
Houston S5	.192••
Jacksonville,Fla. MS	.197
Johnstown,Pa.(43) B2	.190§
Joliet,Ill. A7	.187†
KansasCity,Mo. S5	.192••
Kokomo,Ind. C16	.189†
Minnequa,Colo. C10	.192••
Pittsburg,Calif. C11	.210†
Rankin,Pa. A7	.187†
S.Chicago,Ill. R2	.187••
Sterling,Ill.(7) N15	.192††

WIRE (16 gage)	An'ld Galv. Stone	An'ld Galv. Stone
Ala.City,Ala.R2	17.15	18.70••
Aliq'ppa,Pa. J5	.17.15	18.95
Bartonville K4	..17.25	19.05
Cleveland A7	...17.15	....
Crawf'dsville M8	17.25	19.05
Fostoria,O. S1	..17.65	19.20†
Houston S5	..17.40	18.95••
Jacksonville MS	17.50	19.30
Johnstown B2	..17.15	18.95§
Kan.City,Mo. S5	17.40	....
Kokomo C16	..17.25	18.80†
Minnequa C10	..17.40	18.95••
P'lm'r,Mass. W12	17.45	19.00†
Pitts.,Calif. C11	..17.50	19.05†
SparrowsPt. B2	..17.25	19.05§
Sterling(37) N15	17.25	19.05††
Waukegan A7	..17.15	18.70†
Worcester A7	..17.45	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	8.65 9.20••
Aliquippa J5	....8.65 9.325§
Atlanta(48) A11	..8.75 9.425•
Bartonville(48) K4	8.75 9.425
Buffalo W12	....8.65 9.20†
Cleveland A7	....8.65 ....
Crawfordsville M8	8.75 9.425
Donora,Pa. A7	..8.65 9.20†
Duluth A7	....8.65 9.20†
Fairfield T2	....8.65 9.20†
Houston(48) S5	.8.90 9.45••
Jacks'ville,Fla. MS	9.00 9.675
Johnstown B2(48)	8.65 9.325§
Joliet,Ill. A7	...8.65 9.20†
Kans.City(48) S5	8.90 9.45••
Kokomo C16	....8.75 9.30†
LosAngeles B3	..9.60 10.275§
Minnequa C10	...8.90 9.45••
Monessen P7(48)	..8.65 9.25•
Palmer,Mass. W12	8.95 9.50†
Pitts.,Calif. C11	..9.60 10.15†
Rankin,Pa. A7	..8.65 9.20†
S.Chicago R2	...8.65 9.20••
S.SanFran. C10	..9.60 10.15••
Spar'wsPt.B2(48)	8.75 9.425§
Sterling(48) N15	8.90 9.575††
Sterling(1) (48)	8.80 9.475††
Struthers,O.(48)Y1	8.65 9.30‡
Worcester,Mass.A7	8.95 9.50†

Based on zinc price of: •13.50. †5c. §10c. ‡Less than 10c. ††10.50c. ••Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts
Full Size Body (cut thread)

½ in. and smaller:	
6 in. and shorter	49.0
Longer than 6 in.	39.0
⅝ in. thru 1 in.:	
6 in. and shorter	39.0
Longer than 6 in.	35.0
1⅛ in. and larger:	
All lengths	35.0

Undersized Body (rolled thread)

½ in. and smaller:	
6 in. and shorter	49.0

Carriage, Machine, Lag Bolts
Hot Galvanized:

½ in. and smaller:	
6 in. and shorter	29.0
Longer than 6 in.	15.0
⅝ in. and larger:	
All lengths	12.0

Lag Bolts (all diam.)

6 in. and shorter	49.0
Longer than 6 in.	39.0

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter	49.0
Larger than ½ in. or longer than 6 in.	39.0
Blank Bolts	39.0
Step, Elevator, Tire Bolts	49.0
Stove Bolts, Slotted:	
⅛ to ¼ in. incl., 3 in. and shorter	55.0
⅛ to ½ in., inclusive	55.0

NUTS

Reg. & Heavy Square Nuts:

All sizes	55.5

Square Nuts, Reg. & Heavy, Hot Galvanized:

All sizes	41.0

Hex Nuts, Reg. & Heavy, Hot Pressed:

⅜ in. and smaller	60.5
⅞ in. to 1 in., incl.	55.5
1⅛ in. to 1½ in., incl.	58.5
1⅝ in. and larger	53.5

Hex Nuts, Reg. & Heavy, Cold Punched:

⅜ in. and smaller	60.5
⅞ in. to 1½ in., incl.	55.5
1⅝ in. and larger	53.5

Hex Nuts, All Types, Hot Galvanized:

⅜ in. and smaller	46.5
⅞ in. to 1 in., incl.	41.5
1¼ in. to 1½ in., incl.	46.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

⅜ in. and smaller	60.5
⅞ in. to 1½ in., incl.	55.5
1⅝ in. and larger	53.5

Hex Nuts, Finished (Incl. Slotted and Castellated):

1 in. and smaller	63.0
1⅛ in. to 1½ in., incl.	59.0
1⅝ in. and larger	53.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):

⅝ in. and smaller	60.5
¾ in. to 1 in., incl.	63.0
1⅛ in. to 1½ in., incl.	59.0
1⅝ in. and larger	53.5

CAP AND SETSCREWS
(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Capscrews, Coarse or Fine Thread, Bright:
6 in. and shorter:

⅝ in. and smaller	40.0
¾, ⅞, and 1 in. diam.	22.0
Longer than 6 in.:	
⅝ in. and smaller	8.0
¾, ⅞, and 1 in. diam.	+ 6.0

High Carbon, Heat Treated:
6 in. and shorter:

⅝ in. and smaller	26.0
¾, ⅞, and 1 in. diam.	3.0
Longer than 6 in.:	
⅝ in. and smaller	+ 13.0
¾, ⅞, and 1 in. diam.	+ 32.0

Flat Head Capscrews:

⅜ in. and smaller	+ 76.0

Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam.:

6 in. and shorter	Net
Longer than 6 in.	+ 23

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in., larger 12.25
7/8 in. under: List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft. mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2¼	12	46.99	55.06	41.81
2½	12	51.76	60.65	46.05
2¾	12	56.04	65.67	49.88
3	12	59.76	70.03	53.19

RAILWAY MATERIALS

Rail:	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.525	5.425	....	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Gary,Ind. U5	5.525	5.425	....	...
Huntington,W.Va. C15	....	....	....	6.50
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	...
Johnstown,Pa. B2	....	....	...(16)	6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	5.525	5.425	....	7.00
Steelton,Pa. B2	5.525	5.425	....	...
Williamsport,Pa. S19	....	....	....	6.50

TIE PLATES

Fairfield,Ala. T2	6.60
Gary,Ind. U5	6.60
Ind.Harbor,Ind. I-2	6.60
Lackawanna,N.Y. B2	6.60
Minnequa,Colo. C10	6.60
Seattle B3	6.75
Steelton,Pa. B2	6.60
Torrance,Calif. C11	6.75

JOINT BARS

Bessemer,Pa. U5	6.975
Fairfield,Ala. T2	6.975
Ind.Harbor,Ind. I-2	6.975
Joliet,Ill. U5	6.975
Lackawanna,N.Y. B2	6.975
Minnequa,Colo. C10	6.975
Steelton,Pa. B2	6.975

AXLES

Ind.Harbor,Ind. S13	8.775
Johnstown,Pa. B2	8.775

TRACK BOLTS, Untreated

Cleveland R2	14.75
KansasCity,Mo. S5	14.75
Lebanon,Pa. B2	14.75
Minnequa,Colo. C10	14.75
Pittsburgh P14	14.75
Seattle B3	15.25

SCREW SPIKES

Lebanon,Pa. B2	14.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2, Y1	9.75
KansasCity,Mo. S5	9.75
Lebanon,Pa. B2	9.75
Minnequa,Colo. C10	9.75
Pittsburgh J5	9.75
Seattle B3	10.25
S.Chicago,Ill. R2	9.75
Struthers,O. Y1	9.75
Youngstown R2	9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds: 9.30c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Ambridge, Pa. N2	+9.25	....	+2.75	....	+0.25	....	1.25	....	1.25	....	1	....	3.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Alton, Ill. L1	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Benwood, W. Va. W10	4.5	+22	+7.5	+31	+18	+39.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Butler, Pa. F6	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	+8.25	+23.5	+5.25	+19.5	+1.75	+15	0.75	+14.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sparrows Pt., Md. B2	3.5	+23	+8.5	+32	+19	+40.5	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Wheatland, Pa. W9	5.5	+21	+6	+30	+17	+38.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Alton, Ill. L1	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Etna, Pa. N2	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Fontana, Calif. K1	1.25	+13.25	1.75	+12.75	3.25	+13	3.25	+13	+7.25	+24	+7.25	+24
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Lorain, O. N3	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sharon, Pa. M6	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sparrows Pt., Md. B2	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Wheatland, Pa. W9	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI	—Rerolling—		Forg-ing	H.R.	H.R. Rods; C.F.	Bars; Struc-tural			C.R. Strip; Flat
Type	Ingot	Slabs	Billets	Strip	Wire	Shapes	Plates	Sheets	Wire
201	22.00	27.00	....	36.00	40.00	42.00	44.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	46.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	....	32.00	41.00	....	45.50	48.00	50.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	50.75	55.00	55.00
304L	....	....	48.25	51.50	53.00	55.50	58.50	63.25	63.25
305	28.50	36.75	42.50	47.50	45.25	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	....	....	77.50	....	86.50	91.00	92.75	99.00	104.50
316	39.75	49.50	62.25	69.25	69.25	73.00	76.75	80.75	80.75
316L	....	....	70.00	76.50	77.00	80.75	84.50	89.25	89.25
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
330	....	....	106.75	....	95.25	106.75	105.50	108.00	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	....	....	32.00	....	35.75	37.75	40.25	48.25	48.25
405	19.50	25.50	29.75	36.00	33.50	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	35.00	40.25	40.25
416	....	....	28.75	....	32.50	34.25	36.00	48.25	48.25
420	....	33.50	34.25	41.75	39.25	41.25	45.25	52.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	36.00	40.75	40.75
430F	....	....	29.50	....	33.00	34.75	36.75	51.75	42.00
431	....	28.75	37.75	....	42.00	44.25	46.00	56.00	56.00
446	....	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless Steel Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels Inc.; U. S. Steel Corp.; Universal-Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	34.70	37.95	42.25	46.70	39.75
304L	36.90	40.55	45.10	49.55	....
316	40.35	44.50	49.50	54.50	58.25
316L	45.05	49.35	54.70	60.10	....
316 Cb	47.30	53.80	61.45	69.10	....
321	36.60	40.05	44.60	49.30	47.25
347	38.25	42.40	47.55	52.80	57.00
405	28.60	29.85	33.35	36.85	....
410	28.15	29.55	33.10	36.70	....
430	28.30	29.80	33.55	37.25	....
Inconel	48.90	59.55	70.15	80.85	....
Nickel	41.65	51.95	62.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.95	40.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.305	Cr-Hot Work	0.475
Extra Carbon	0.360	W-Cr Hot Work	0.500
Special Carbon	0.475	V-Cr Hot Work	0.520
Oil Hardening	0.475	Hi-Carbon-Cr	0.925

Grade by Analysis (%)

W	Cr	V	Co	Mo		$ per lb
20.25	4.25	1.6	12.25	....	....	4.285
18.25	4.25	1	4.75	....	....	2.500
18	4	2	9	....	....	2.870
18	4	2	....	....	....	1.960
18	4	1	....	....	....	1.795
9	3.5	..	....	....	....	1.395
13.5	4	3	....	....	....	2.060
13.75	3.75	2	5	..	....	2.440
6.4	4.5	1.9	....	5	....	1.300
6	4	3	....	6	....	1.545
1.5	4	1	....	8.5	....	1.155

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50‡	....	....
Birmingham U6	....	62.50‡	66.50	....
Woodward, Ala. W15	62.00**	62.50‡	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago, Ill. R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.12	69.62	69.62	70.12
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	68.00	68.50	69.00	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69. ½	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	68.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....

	Basic	No. 2 Foundry	Malleable	Bessemer
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	67.00
Mansfield, Ohio, deld.	70.90	....	71.40	71.90
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah, C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.54	73.04	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio. I-3, J1	78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, $9 freight allowed K2	103.50
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$78.50
Troy, N.Y. R2 (Phos. 0.035% max)	74.00
Philadelphia, deld.	82.67
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††§		Carbon	Floor
Atlanta	8.59§	9.86§	....	....	8.64	9.01	10.68	....	9.05	8.97	10.90
Baltimore	8.28	8.88	9.61	....	8.76	9.06	11.34 #	15.18	9.19	8.66	10.14
Birmingham	8.18	9.45	11.07	....	8.23	8.60	10.57	....	8.64	8.56	10.70
Boston	9.38	10.44	11.45	53.50	9.42	9.73	12.90 #	15.28	9.63	9.72	11.20
Buffalo	8.40	9.00	10.07	55.98	8.50	8.80	10.90 #	15.00	8.90	8.90	10.45
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.20	9.45	10.00	53.00	8.23	8.60	8.80	14.65	8.64	8.56	9.88
Cincinnati	8.34	9.48	10.05	52.43	8.54	8.92	9.31	14.96	9.18	8.93	10.21
Cleveland	8.18	9.45	9.95	52.33	8.33	8.69	10.80 #	14.74	9.01	8.79	10.11
Dallas	8.85	10.15	....	....	9.00	8.95	11.01	....	9.00	9.45	10.70
Denver	9.38	11.75	....	....	9.41	9.78	11.10	....	9.82	9.74	11.06
Detroit	8.43	9.70	10.35	56.50	8.58	8.90	9.15	14.91	9.18	8.91	10.13
Erie, Pa.	8.20	9.45	9.95¹§	....	8.50	8.75	9.05¹§	....	9.00	8.85	10.10
Houston	7.45	8.75	8.45	....	7.60	7.55	11.10	....	7.60	8.05	10.30
Jackson, Miss.	8.52	9.79	....	....	8.57	8.94	10.68	....	8.97	8.90	10.74
Los Angeles	8.50	10.75	11.65	57.60	8.55	8.55	12.00	....	8.60	8.55	9.95
Memphis, Tenn.	8.55	9.80	....	....	8.60	8.97	11.96 #	....	9.01	8.93	10.56
Milwaukee	8.33	9.58	10.13	....	8.36	8.73	9.03	14.78	8.85	8.69	10.01
Moline, Ill.	8.55	9.80	10.35	....	8.58	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	10.56	53.08	9.31	9.57	12.76 #	15.09	9.35	9.43	10.71
Norfolk, Va.	8.05	....	....	....	8.55	8.60	10.80	....	8.95	8.45	9.95
Philadelphia	8.00	8.90	9.92	52.69	8.69	8.65	11.51 #	15.01	8.50	8.77	9.77**
Pittsburgh	8.18	9.45	10.35	52.00	8.33	8.60	10.80 #	14.65	8.64	8.56	9.88
Portland, Oreg.	8.50	11.20	11.55	57.38	9.55	8.65	14.50	15.95	8.65	8.30	11.50
Richmond, Va.	8.45	....	10.40	....	9.15	9.15	....	....	9.40	8.85	10.35
St. Louis	8.54	9.79	10.36	....	8.59	8.97	9.41	15.01	9.10	8.93	10.25
St. Paul	8.79	10.04	10.71	....	8.84	9.21	9.66	....	9.38	9.30	10.49
San Francisco	9.35	10.75	11.00	55.10	9.45	9.70	13.00	16.10	9.50	9.60	12.00
Seattle	9.95	11.15	12.00	57.38	10.00	10.10	14.05	16.35	9.80	9.70	12.10
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	9.95	11.15	12.00	57.38	10.00	10.10	14.05	17.20	9.80	9.70	12.10
Washington	8.88	....	....	....	9.36	9.56	10.94	....	9.79	9.26	10.74

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; ‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; §—400 to 9999 lb; §—1000 to 1999 lb; ¹§—2000 to 3999 lb; ¹⁰—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, Ohio, $138; Cutler, Utah, $165.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $150; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa. Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Snow Shoe, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Snow Shoe, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-41; 70%, $36.40; 60%, $33-36.50. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $33-34; Mexican, all rail, duty paid, $25.25-25.75; barge, Brownsville, Tex., $27.25-27.75.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	25.00
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	27.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$12.00-12.50*
Domestic, concentrates f.o.b. milling points	20.00

*Before duty.

Manganese Ore

Mn 46-48%, Indian (export tax included), $135 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; other than Indian, nominal; contracts by negotiation.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$50.00
48% 2.8:1	48.00
48% no ratio	39.00

South African Transvaal

48% no ratio	$37.00
44% no ratio	27.00

Turkish

48% 3:1	$55.00

Domestic

Rail nearest seller

18% 3:1	39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.60
60-65%	2.60-2.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi River, ocean bags 23,000 lb and over.. F.o.b. Riverton or Camden, N. J., west of Mississippi River.	10.50 / 9.50
Sponge Iron, Domestic, 98 + % Fe: Deld. east of Mississippi River, 23,000 lb and over	10.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.00
Annealed, 99.5% Fe..	36.50
Unannealed (99 + % Fe)	36.00
Unannealed (99 + % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)..	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum, freight allowed	
Carlots	39.50
Ton lots	41.50
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	30.30-45.70†
Bronze, 5000-lb lots	45.70-49.80†
Copper: Electrolytic	14.75*
Reduced	14.75*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.15
Nickel-Silver, 5000-lb lots	47.80-52.60†
Phosphor-Copper, 5000-lb lots	57.80
Copper (atomized) 5000-lb lots	38.30-46.80‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.07
Stainless Steel, 316	$1.26
Tin	14.50*
Zinc, 5000-lb lots	17.50-30.70‡

Tungsten:	Dollars
Melting grade, 99%	
60 to 200 mesh:	
1000 lb and over..	3.15
Less than 1000 lb ..	3.30
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$60.75
2½	30	39.25
3	40	37.00
4	40	35.00
5⅛	40	34.75
6	60	31.50
7	60	28.25
8, 9, 10	60	28.00
12	72	26.75
14	60	26.75
16	72	25.75
17	60	26.25
18	72	26.25
20	72	25.25
24	84	26.00

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.75
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	31.84
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, Mich., deld.	32.25
Saginaw, Mich., deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens: New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, Ohio, ovens	29.00
Cincinnati, deld.	31.84
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Neville Island (Pittsburgh), Pa., ovens	29.25
Painesville, Ohio, ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
St. Paul, ovens	29.75
Chicago, deld.	33.29
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.85 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries.)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.88	$5.42	$5.42	$5.78
Bar Size Angles	5.77	5.65	5.65	5.95
Structural Angles	5.77	5.65	5.65	5.95
I-Beams	5.72	5.60	5.60	6.02
Channels	5.72	5.60	5.60	6.02
Plates (basic bessemer)	7.64	7.59	7.64	7.88
Sheets, H.R.	8.25	8.20	8.20	8.50
Sheets, C.R. (drawing quality)	9.00	8.95	8.95	9.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	26.20	26.20	26.20	27.05
Barbed Wire (†)	6.95	6.95	6.95	7.40
Merchant Bars	6.37	6.32	6.37	6.61
Hot-Rolled Bands	7.20	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.73	6.73	6.73	7.13
Wire Rods, O.H. Cold Heading Quality No. 5	7.07	7.07	7.07	7.47
Bright Common Wire Nails (§)	8.12	8.12	8.12	8.32

†Per 82 lb, net, reel. §Per 100-lb kegs, 20d nails and heavier.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	29.50
Industrial xylene	32.00-34.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00-34.00

Cents per pound, producing point

Phenol: Grade 1, 17.50; Grade 2-3, 15.50; Grade 4, 17.50; Grade 5, 16.50; Grade 6, 14.50.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Neville Island, Pa., 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively. (Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2% from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38.43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.

Cr 67.71%, carload, lump, bulk, C 0.02% max, 41.00c per lb contained Cr; 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c, less ton 34.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 21.25c per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" x down, 27.50c per lb contained Cr, 14.20c per lb contained Si. 0.75" x down, 28.65c per lb contained Cr, 14.20c per lb contained Si. Delivered.

Chromium Metal Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ¼" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.50 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35%-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carload 9.50c, per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Contract, carload, bulk 19.60c per lb of briquet, carload packed in box pallets 19.80c, in bags 20.70c; 3000 lb to c.l. in box pallets 21.00c; 2000 lb to c.l. in bags, 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l., bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c. 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c; (Small size—weighing approx 2½ lb and containing 1 lb of Si.) Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.0bc; 3000 lb to c.l. pallets 9.65c; 2000 lb to c.l., bags, 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $2.95 per lb of contained W; 2000 lb W to 5000 lb W, $3.05; less than 2000 lb W, $3.17. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8 % max, C 0.4% max). Contract, ton lot 2" x D, $4.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $4.25 per lb of contained Cb plus Ta, delivered; less ton lot $4.30.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5.7%, Fe 20% approx). Contract, c.l. packed ½-in. x 12 M 20.00c per lb of alloy, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $110 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa. $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

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Undersize body, roll thread	#10-24 dia. x ½ in. long through ½ in. dia. x 6 in. long
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Square head, gimlet point	¼ in. dia. x 1 in. long through ¾ in. dia. x 16 in. long
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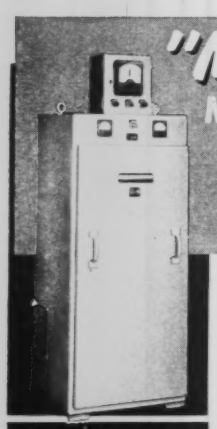

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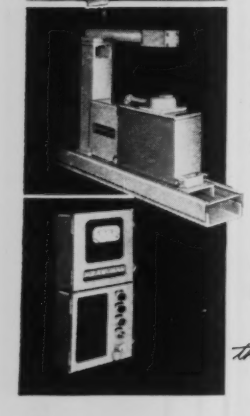

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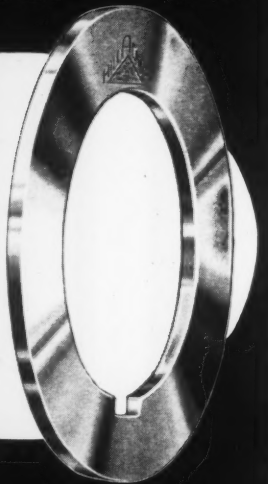

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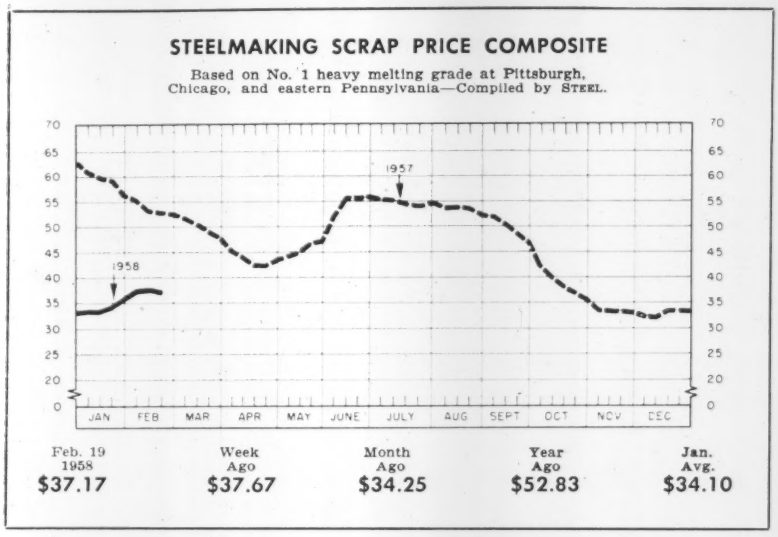

STEELMAKING SCRAP PRICE COMPOSITE
Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania—Compiled by STEEL.
1957
1958
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
Feb. 19 1958 $37.17
Week Ago $37.67
Month Ago $34.25
Year Ago $52.83
Jan. Avg. $34.10

Scrap Market Bullishness Fading

After advancing steadily since the start of the new year, STEEL's composite on the prime grade reverses trend, declining 50 cents to $37.17. Two blast furnaces resume

Scrap Prices, Page 132

Chicago—The local scrap market is beginning to sag. Part of the easing appears to result from consumer resistance to the unrealistic prices and part from the dim prospect for an upturn in steelmaking in the next few weeks.

Orginally, March was expected to be the turning point for the operating rate, but mills are not receiving orders in a volume sufficient to bring this about. Scrap buying is a little more active but is still limited. A steelmaking rate below 60 per cent of capacity pretty well tells the story. In the bearish market atmosphere, brokers are offering dealers $1 to $2 a ton less than they were ten days ago.

Philadelphia—Prices remain firm throughout the list. Domestic demand is light, but supplies are scarce, partly because of severe weather. District yards say incoming tonnage amounts to only 30 to 40 per cent of normal volume, and industrial material is coming out slowly. Also bolstering domestic scrap prices is export demand. About 18,000 tons of steel scrap will leave this port in February. Normally, this wouldn't make much of a dent, but with the supply situation as it is, it is important.

New York—Despite slower scrap collections due to heavy snows and freezing weather, brokers have been reducing their buying prices on the

(*Please turn to Page* 137)

Pig Iron Use Up, Scrap Off

Last year, pig iron consumption increased while scrap use declined, reports the U. S. Bureau of Mines. The figures: Pig iron, 68,119,799 gross tons, vs. 66,968,000 tons in 1956; scrap, 65,679,178 tons, vs. 71,710,000 tons in '56.

The data, reflecting greater dependence on pig iron than scrap in the iron melt, show a reversal in usage. In 1957, pig iron consumption topped use of scrap by 2,440,621 tons. In 1956, scrap used exceeded pig iron consumption by 4,742,000 tons.

Dependence on pig iron became noticeably heavier around April. Monthly consumption of scrap in the first quarter of the year exceeded that of pig iron. During the remainder of the year, pig iron use topped that of scrap every month.

The situation explains in part the sharp decline in scrap prices during the last half of 1957. STEEL's composite price on No. 1 heavy melting steel stood at $55.33 on July 1. At the end of the year, it was $33.17.

Stocks of scrap at the end of 1957 Came to 8,006,000 gross tons, against 6,621,478 at the end of 1956. Pig iron stocks were 3,411,000 tons, vs. 2,102,496 tons. Here are the comparative figures:

SCRAP CONSUMPTION & STOCKS—1957-56
(Gross tons)

Months	Consumption 1957	Consumption 1956	Stocks at End of Month 1957	Stocks at End of Month 1956
January	6,630,804	6,688,977	6,528,135	6,375,547
February	6,038,436	6,345,421	6,523,035	6,400,165
March	6,294,038	6,733,076	6,572,422	6,127,707
April	5,816,309	6,490,680	6,586,114	6,014,918
May	5,753,435	6,491,567	6,524,031	6,298,618
June	5,430,607	5,994,989	6,525,916	6,191,341
July	4,897,752	1,986,613	7,023,107	6,261,368
August	5,299,543	5,453,927	7,493,892	6,274,545
September	5,033,998	6,231,017	7,941,835	6,059,165
October	5,333,767	6,722,320	8,135,372	6,181,076
November	4,858,489	6,305,947	8,007,423	6,212,242
December	4,282,000*	6,264,955	8,006,000*	6,621,478
Totals	65,679,178*	71,710,000	.....	.....

*Preliminary.

PIG IRON CONSUMPTION & STOCKS—1957-56
(Gross tons)

Months	Consumption 1957	Consumption 1956	Stocks at End of Month 1957	Stocks at End of Month 1956
January	6,482,472	6,275,224	2,024,625	2,011,677
February	5,860,099	5,871,824	2,000,821	1,974,634
March	6,155,334	6,316,836	2,177,658	1,934,936
April	5,856,587	6,077,074	2,253,929	1,952,142
May	5,862,966	6,064,632	2,420,139	2,046,446
June	5,672,086	5,642,004	2,491,952	2,066,708
July	5,558,702	963,749	2,878,719	2,159,930
August	5,769,995	4,618,718	3,086,853	2,076,382
September	5,645,036	6,053,147	3,242,471	2,139,236
October	5,669,624	6,450,404	3,309,569	2,124,841
November	5,073,898	6,237,538	3,298,738	2,060,879
December	4,513,000*	6,396,468	3,411,000*	2,102,496
Totals	68,119,799*	66,968,000	.....	.....

*Preliminary.
Data from the U. S. Bureau of Mines.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Feb. 19, 1958. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Feb. 19	$37.17
Feb. 12	37.67
Jan. Avg.	34.10
Feb. 1957	53.41
Feb. 1953	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	*32.00-33.00*
No. 1 dealer bundles	*34.00-35.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling	*34.00-35.00*
No. 1 factory bundles	*38.00-39.00*
Machine shop turnings	17.00-18.00
Mixed borings, turnings	17.00-18.00
Short shovel turnings	21.00-22.00
Cast iron borings	21.00-22.00
Cut structurals:	
2 ft and under	*41.00-42.00*
3 ft lengths	*40.00-41.00*
Heavy turnings	34.00-35.00
Punchings & plate scrap	*40.00-41.00*
Electric furnace bundles	*40.00-41.00*

Cast Iron Grades

No. 1 cupola	*40.00-41.00*
Stove plate	*40.00-41.00*
Unstripped motor blocks	26.00-27.00
Clean auto cast	42.00-43.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Angles, splice bars	49.00-50.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	*175.00-185.00*
18-8 turnings	*85.00-90.00*
430 bundles & solids	*100.00-110.00*
430 turnings	50.00-55.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	21.00-22.00
No. 1 factory bundles	33.00-34.00
No. 1 bundles	33.00-34.00
No. 2 bundles	23.00-24.00
No. 1 busheling	33.00-34.00
Machine shop turnings	11.00-12.00
Short shovel turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut foundry steel	36.00-37.00
Cut structurals, plates 2 ft and under	41.00-42.00
Low phos. punchings & plate	34.00-35.00
Alloy free, short shovel turnings	19.00-20.00
Electric furnace bundles	34.00-35.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	36.00-37.00
Heavy breakable cast	36.00-37.00
Stove plate	43.00-44.00
Unstripped motor blocks	26.00-27.00
Brake shoes	34.00-35.00
Clean auto cast	45.00-46.00
Burnt cast	33.00-34.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	60.00-61.00
Rails, 2 ft and under	57.00-58.00
Rails, 18 in. and under	58.00-59.00
Rails, random lengths	50.00-51.00
Cast steel	47.00-48.00
Railroad specialties	51.00-52.00
Uncut tires	41.00-42.00
Angles, splice bars	51.00-52.00
Rails, rerolling	56.00-57.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

YOUNGSTOWN

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	25.00-26.00
No. 1 busheling	37.00-38.00
No. 1 bundles	37.00-38.00
No. 2 bundles	24.00-25.00
Machine shop turnings	13.00-14.00
Short shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	38.00-39.00
Electric furnace bundles	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00-43.00

CHICAGO

No. 1 heavy melt., indus.	*39.00-40.00*
No. 1 hvy melt., dealer	37.00-38.00
No. 2 heavy melting	34.00-35.00
No. 1 factory bundles	41.00-42.00
No. 1 dealer bundles	*38.00-39.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling, indus.	*39.00-40.00*
No. 1 busheling, dealer	37.00-38.00
Machine shop turnings	*22.00-23.00*
Mixed borings, turnings	*24.00-25.00*
Short shovel turnings	*24.00-25.00*
Cast iron borings	*24.00-25.00*
Cut structurals, 3 ft	*44.00-45.00*
Punchings & plate scrap	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	*41.00-42.00*
Stove plate	*38.00-39.00*
Unstripped motor blocks	*32.00-33.00*
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*
R.R. malleable	54.00-55.00
Rails, 2 ft and under	*54.00-55.00*
Rails, 18 in. and under	*55.00-56.00*
Angles, splice bars	*51.00-52.00*
Axles	*54.00-55.00*
Rails, rerolling	*54.00-55.00*

Stainless Steel Scrap

18-8 bundles & solids	160.00-165.00
18-8 turnings	*85.00-95.00*
430 bundles & solids	90.00-100.00
430 turnings	47.50-52.50

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
No. 1 busheling	27.00-28.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	10.00-11.00
Short shovel turnings	11.00-12.00
Punchings & plate	29.00-30.00

Cast Iron Grades

No. 1 cupola	29.00-30.00
Stove plate	25.00-26.00
Charging box cast	25.00-26.00
Heavy breakable	24.00-25.00
Unstripped motor blocks	16.00-17.00
Clean auto cast	33.00-34.00
Malleable	32.00†

†Nominal

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	33.00
No. 2 heavy melting	30.00
No. 1 bundles	33.00
No. 2 bundles	25.00
No. 1 busheling	33.00
Machine shop turnings	19.00
Short shovel turnings	21.00

Cast Iron Grades

No. 1 cupola	*43.00*
Charging box cast	32.00
Heavy breakable cast	32.00
Unstripped motor blocks	*33.00*
Clean auto cast	44.00
Stove plate	*40.00*

Railroad Scrap

No. 1 R.R. heavy melt.	37.00
Rails, 18 in. and under	51.00
Rails, random lengths	46.00
Rails, rerolling	53.50
Angles, splice bars	47.50

PHILADELPHIA

No. 1 heavy melting	38.50
No. 2 heavy melting	35.00
No. 1 bundles	38.50
No. 2 bundles	28.00
No. 1 busheling	38.50
Electric furnace bundles	40.00
Mixed borings, turnings	22.50†
Short shovel turnings	24.00†
Machine shop turnings	22.00†
Heavy turnings	34.00†
Structurals & plate	43.00-44.00
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	58.00-60.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	40.00
Malleable	58.00
Drop broken machinery	49.00

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*34.00-36.00*
No. 2 heavy melting	*31.00-32.00*
No. 1 bundles	*34.00-36.00*
No. 2 bundles	*23.00-24.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Short shovel turnings	14.00-15.00
Low phos. (structurals & plate)	Nominal

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	32.00
Heavy breakable	32.00-33.00

Stainless Steel

18-8 sheets, clips, solids	140.00-150.00
18-8 borings, turnings	50.00
410 sheets, clips, solids	60.00-65.00
430 sheets, clips, solids	75.00-80.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	36.00
No. 2 heavy melting	22.00
No. 1 bundles	29.00
No. 2 bundles	17.00
No. 1 busheling	29.00
Machine shop turnings	9.50-10.00†
Mixed borings, turnings	9.50-10.00
Short shovel turnings	11.00-11.50†
No. 1 cast	29.00-30.00
Mixed cupola cast	28.00-29.00
No. 1 machinery cast	35.00-36.00

†Nominal

BUFFALO

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 2 bundles	23.00-24.00
No. 1 busheling	28.00-29.00
Mixed borings, turnings	14.00-15.00
Machine shop turnings	12.00-13.00
Short shovel turnings	15.00-16.00
Cast iron borings	14.00-15.00
Low phos.	32.00-33.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	39.00-40.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	39.00-40.00
Rails, 3 ft and under	46.00-47.00
Railroad specialties	33.00-34.00

CINCINNATI

(Brokers' buying prices; f.o.b shipping point)

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.50-25.50
No. 1 bundles	29.00-30.00
No. 2 bundles	23.00-24.00
No. 1 busheling	29.00-30.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	*18.00-19.00*
Cast iron borings	15.00-16.00
Low phos. 18 in.	*38.00-39.00*

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable cast	33.00-34.00
Charging box cast	33.00-34.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, 18 in. and under	54.00-55.00
Rails, random lengths	44.00-45.00

BIRMINGHAM

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	31.00-32.00
No. 2 bundles	20.00-21.00
No. 1 busheling	31.00-32.00
Cast iron borings	12.00-13.00
Machine shop turnings	23.00-24.00
Short shovel turnings	24.00-25.00
Bar crops and plates	39.00-40.00
Structurals & plate	38.00-39.00
Electric furnace bundles	36.00-37.00
Electric furnace:	
2 ft and under	35.00-36.00
3 ft and under	34.00-35.00

Cast Iron Grades

No. 1 cupola	*50.00-51.00*
Stove plate	49.00-50.00
Unstripped motor blocks	*40.00-41.00*
Charging box cast	22.00-23.00
No. 1 wheels	38.00-39.00

Railroad Scrap

No. 1 R. R. heavy melt.	36.00-37.00
Rails, 18 in. and under	49.00-50.00
Rails, rerolling	45.00-46.00
Rails, random lengths	*43.00-44.00*
Angles, splice bars	42.00-43.00

SEATTLE

No. 1 heavy melting	28.00
No. 2 heavy melting	26.00
No. 1 bundles	22.00
No. 2 bundles	21.00
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Electric furnace No. 1	38.00

Cast Iron Grades

No. 1 cupola	31.00
Heavy breakable cast	28.00
Unstripped motor blocks	23.00
Stove plate (f.o.b. plant)	21.00

LOS ANGELES

No. 1 heavy melting	32.00
No. 2 heavy melting	*30.00*
No. 1 bundles	28.00
No. 2 bundles	*20.00*
Machine shop turnings	*9.00*
Shoveling turnings	*11.00*
Cast iron borings	*10.00*
Cut structurals and plate 1 ft and under	*43.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*38.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00*

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	22.00
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Short shovel turnings	15.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

No. 1 heavy melting	32.00
No. 2 heavy melting	27.00
No. 1 bundles	32.00
No. 2 bundles	22.00
Mixed steel scrap	27.00
Mixed borings, turnings	17.00
Busheling, new factory:	
Prepared	32.00
Unprepared	26.00
Short steel turnings	21.00

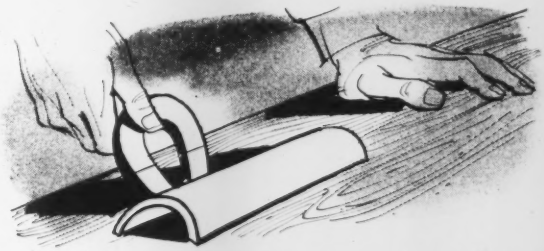
Cast Iron Grades†

No. 1 machinery cast	45.00-50.00

†F.o.b. Hamilton, Ont.

S-E-G-R-E-G-A-T-E-D SCRAP IS WORTH MORE

Rub specimen with emery paper to obtain clean surface. Add 1 drop of 1:1 Nitric Acid. If there is no attack the material is STAINLESS STEEL.



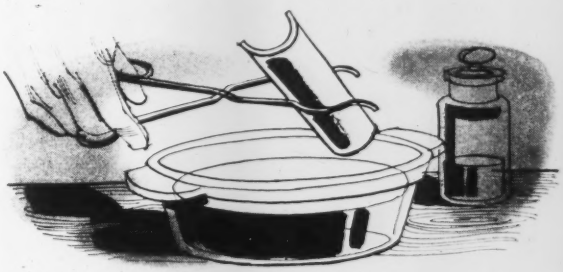
Test sample with magnet. Non-magnetic results indicate that sample is one of the 18-8 stainless steels.

Here is how to test for

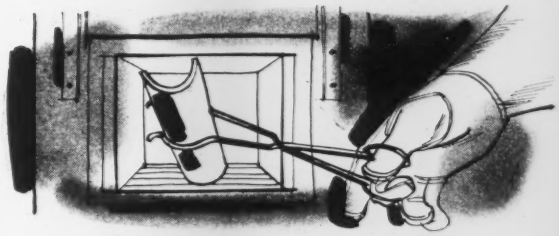
STAINLESS STEEL TYPES 302 and 304

Last year, these two basic 18-8 stainless steel types accounted for the largest percentage of all the stainless steel produced. A recent survey among fabricators indicates that 68 percent expect to use more stainless steel in the future. To satisfy this expanding market for special steels, today's producers and fabricators require more and more scrap of known analysis.

Our personnel, equipment, experience and strategically located facilities are geared to the purchase or sale of dependably segregated metals. We welcome your inquiry.



Place specimen in a solution of Muriatic Acid (1 part water, 1 part Muriatic Acid) at a temperature of 180/190 degrees F. After 5 minutes TYPES 302, 304, 305, 316, 317, 321 and 347 will be white, while 303 will have black smudge. Then, place specimen in fresh solution of Muriatic Acid at temperature of 180/190 degrees F. Within 2 minutes there will be active attack and gas evolution on Types 302, 304, 321 and 347.



To separate Types 302 and 304 from 321 and 347, a stabilization test is necessary. Heat specimens to 1250 degrees F for 2 hours and then cool to room temperature in air. Then place specimens in cold solution of 3 parts Nitric Acid, 1 part Hydrofluoric Acid and 6 parts water. Leave for 1 hour. Remove specimens from solution and wash with water. STAINLESS TYPES 302 and 304 will have a rough granular surface.

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Copper Market Is Dull

Falling London and custom smelter quotations point up lack of customer interest in the red metal. Platinum price falls again. More lead, zinc cutbacks

Nonferrous Metal Prices, Pages 136 & 137

COPPER PRICES continue to plunge, and there is no sign of an early upturn.

Unable to move their output in the lackluster market, custom smelters have lowered their price to 23.5 cents a pound. The half cent a pound drop moves the spread between custom smelters and primary producers (25 cents a pound) to 1.5 cents. Most observers look for the custom smelter quotation to fall even lower—sales remain sluggish even at 23.5 cents.

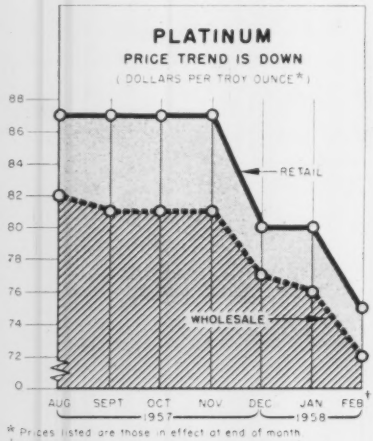
Overseas—One reason domestic prices are none too stable is the low price on the London Metal Exchange (about 20 cents a pound). Observers see no substantial gain here in the next few weeks.

The weakness in LME and custom smelter quotations, coupled with disappointing sales, keeps the primary price in jeopardy. Opinion is about evenly divided on whether another slash is imminent.

Tariff — If primary producers lower the price to 24 cents or below, a 2 cent a pound import-excise tax goes on. But a time lag is involved. The way the law reads, the average price must stay at 24 cents a pound or lower for a calendar month before the tariff becomes effective. After that, up to 15 days is allowed for the Tariff Commission to make its report to the President, and the President has 20 days to issue the tariff proclamation.

Many believe the tax would tend to depress LME prices even more; others think LME prices will sink more regardless of the tax. Some sources point out that a tariff would tax some American producers. Several domestic companies are bringing in their own foreign-mined metal. Even if the price holds above 24 cents, a 1.7 cent a pound tax goes on June 31.

Statistically Good—Producers say sales continue to lag at home although they are good overseas. But despite the traces of pessimism, statistics just released by the Copper Institute show January was a good month for U. S. producers. World deliveries to fabricators increased from the December figure of 218,347 tons to 259,878 tons, the best month since March, 1957, and stocks went down almost 10,000 tons to 448,900 tons. Shipments in the U. S. rose from 84,446 tons to 109,707 tons, while refined stocks dropped from 181,024 tons to 176,287 tons. It's estimated that about 11,000 tons went to stockpile in January.



* Prices listed are those in effect at end of month
† Through February 14

More Zinc Cutbacks

The wave of production curtailments in this segment of the nonferrous industry continues. St. Joseph Lead Co. is trimming output from 12,000 to 8500 tons at its Josephtown, Pa., smelter. The company's Balmat and Edwards mines will go from a five to a four-day workweek to reduce output of concentrates by 2000 tons a month. Company lead operations will be cut 6000 tons by either going to a four-day week for 15 weeks or suspending production for a three-week vacation shutdown.

Matthiessen & Hegeler Zinc Co. has reduced slab output at its Meadowbrook, W. Va., plant by 850 tons a month.

Platinum Prices Fall

Platinum also has been hit by price dips in the last few months (see chart). Immediate cause of the decline: Russia is dumping quantities of low-cost metal.

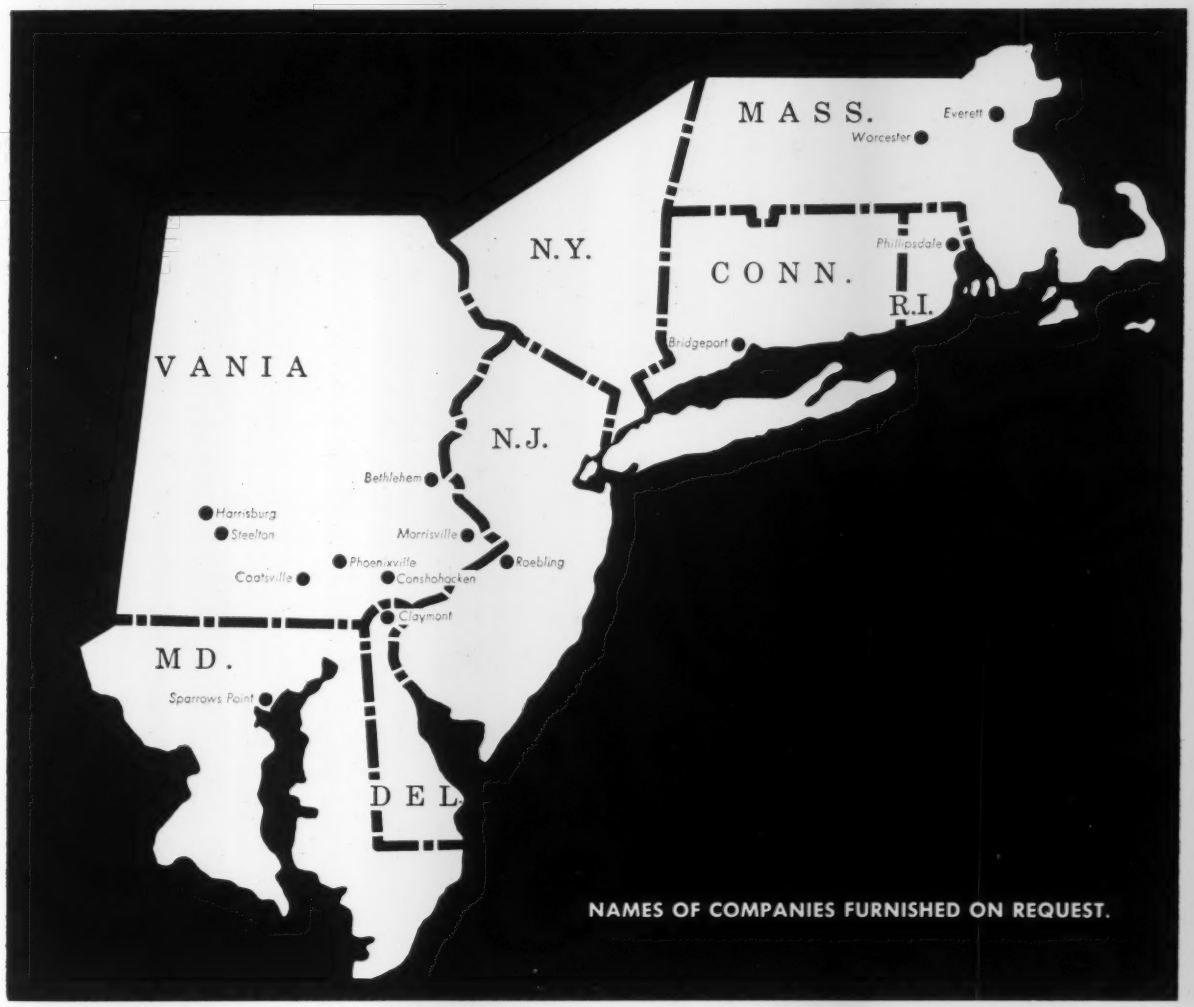
The real problem: More production than consumption. Until about a year ago, there was great demand for catalyst applications in making high octane gasoline.

The rate of oil refinery consumption is lower now, and the metal is in oversupply. But production cutbacks, plus growing markets, are expected to bring in a better supply-demand balance shortly, say producers.

NONFERROUS PRICE RECORD

	Price Feb. 19	Last Change	Previous Price	Jan. Avg	Dec. Avg	Feb., 1957 Avg
Aluminum ..	**26.00**	**Aug. 1, 1957**	**25.00**	**26.000**	**26.000**	**25.000**
Copper	23.50–25.00	Feb. 13, 1958	24.00–25.00	25.135	26.130	32.863
Lead	**12.80**	**Dec. 2, 1957**	**13.30**	**12.800**	**12.800**	**15.800**
Magnesium .	**35.25**	**Aug 13, 1956**	**33.75**	**35.250**	**35.250**	**35.250**
Nickel	**74.00**	**Dec. 6, 1956**	**64.50**	**74.000**	**74.000**	**74.000**
Tin	94.375	Feb. 19, 1958	94.00	92.933	92.395	101.159
Zinc	**10.00**	**July 1, 1957**	**10.50**	**10.000**	**10.000**	**13.500**

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. shipping point; MAGNESIUM, pig, 99.8%, Velasco, Tex.



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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 29.90; No. 43, 29.70; No. 195, 31.30; No. 241, 31.50; No. 356, 29.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 23.50-24.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per ton, ton lots.

Cadmium: Sticks and bars, $1.55 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $55-90 per lb, nom.

Copper: Electrolytic, 25.00 deld.; custom smelters, 23.50; lake, 25.00 deld.; fire refined, 24.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-90 nom. per troy oz.

Lead: Common, 12.80; chemical, 12.90; corroding, 12.90, St. Louis, New York basis, add 0.20.

Lithium: 98 + %, 50-100 lb, cups or ingots, $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. thick, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $220-225 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.o.b. Copper Cliff, Ont.

Osmium: $70-100 per troy oz nom.

Palladium: $19-21 per troy oz.

Platinum: $72-75 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $7.50 per lb, commercial grade.

Silver: Open market, 88.625 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 94.375.

Titanium: Sponge, 99.3+ %, grade A-1 ductile (0.3% Fe max.), $2.25; grade A-2 (0.5% Fe max.), $2.00 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.15 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+ % hydrogen reduced, $3.85.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 11.35; special high grade, 11.75 deld. Diecasting alloy ingot No. 3, 14.25; No. 2, 15.25; No. 5, 14.75 deld.

Zirconium: Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.00-25.50; No. 12 foundry alloy (No. 2 grade), 21.00-21.75; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 24.00-26.00; 108 alloy, 21.50-21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.00; grade 2, 21.25; grade 3, 20.00; grade 4, 18.00.

Brass Ingot: Red brass, No. 115, 25.75; tin bronze, No. 225, 34.50; No. 245, 29.25; high-leaded tin bronze, No. 305, 29.75; No. 1 yellow, No. 405, 21.25; manganese bronze, No. 421, 23.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.80, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.78, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 30.355; l.c.l., 30.98. Weatherproof, 30,000-lb lots, 32.53; l.c.l., 33.28. Magnet wire deld., 38.43, before quantity discounts.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $18.50 per cwt; pipe, full coils, $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $9.50-15.95; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.00-31.25; forged or H.R. bars, ribbon zinc in coils, 20.50; plates 19.00, $11.00-17.40.

ZIRCONIUM

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strips, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.136	43.10-47.60	.....
0.135-0.096	43.60-48.70	40.50-41.10
0.095-0.077	44.30-50.50	40.60-41.30
0.076-0.061	44.90-52.80	40.80-42.00
0.060-0.048	45.60-55.10	41.40-43.10
0.047-0.038	46.20-57.90	41.90-44.50
0.037-0.030	46.60-62.90	42.30-46.30
0.029-0.024	47.20-54.70	42.60-47.00
0.023-0.019	48.20-58.10	43.70-45.40
0.018-0.017	49.00-55.40	44.30-46.00
0.016-0.015	49.90-56.30	45.10-46.80
0.014	50.90	46.10-47.80
0.013-0.012	52.10	46.80
0.011	53.10	48.00
0.010-0.0095	54.60	49.40
0.009-0.0085	55.90	50.90
0.008-0.0075	57.50	52.10
0.007	59.00	53.60
0.006	60.60	55.00

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.70	47.50
5050-F	43.80	48.60
3004-F	44.80	50.50
5052-F	44.40	51.20
6061-T6	46.90	53.00
2024-T4	50.60	57.40
7075-T6*	58.40	66.00

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	78.20	75.20	....	....
0.156-0.172	66.20	63.40	....	....
0.188	66.20	63.40	....	81.60
0.219-0.234	63.00	61.50	....	....
0.250-0.281	63.00	61.50	....	77.90
0.313	63.00	61.50	....	74.20
0.344	62.50	....	....	....
Cold-Finished				
0.375-0.547	62.50	61.30	74.80	69.80
0.563-0.688	62.50	61.30	71.10	65.50
0.719-1.000	61.00	59.70	64.90	61.70
1.063	61.00	59.70	....	59.60
1.125-1.500	58.60	57.40	62.80	59.60
Rolled				
1.563	57.00	55.70	....	....
1.625-2.000	56.30	54.90	....	57.50
2.125-2.500	54.80	53.40	....	....
2.563-3.375	53.20	51.70	....	....

Forging Stock: Round, Class 1, random lengths: 2014-F, 46.90-53.90, diam. 1-8 in.; 6061-F, 43.50-53.90, diam. 1-6 in.; 7075-F, 63.50-73.90, diam. 1-3.875 in.; 7079-F, 68.50-78.90, diam. 1-3.875 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$19.40	2	$ 59.90
1	30.50	4	165.05
1¼	41.30	6	296.10
1½	49.40	8	445.55

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.40-47.00	60.60-64.80
12-14	45.70-47.20	61.30-65.80
15-17	45.90-47.90	62.50-67.50
18-20	46.50-48.30	64.50-70.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, .25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 13.50-14.00; old sheets, 10.50-11.00; borings and turnings, 6.50-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	48.13b	45.36c	....	48.32
Yellow Brass	42.69	31.03d	43.23	45.60
Low Brass, 80%	44.90	44.84	45.44	47.71
Red Brass, 85%	45.67	45.61	46.21	48.48
Com. Bronze, 90%	46.98	46.92	47.52	49.54
Manganese Bronze	50.73	44.91	55.44	....
Muntz Metal	45.19	41.00	....	....
Naval Brass	47.07	41.38	54.13	50.48
Silicon Bronze	52.84	52.03	52.88	58.18
Nickel Silver, 10%	57.93	60.26	60.26	....
Phos. Bronze, A-5%	67.17	67.67	67.67	68.85

SCRAP ALLOWANCES f

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.000	21.000	20.250
Yellow Brass	16.125	15.875	14.500
Low Brass, 80%	17.875	17.625	17.125
Red Brass, 85%	18.625	18.375	17.875
Com. Bronze, 90%	19.250	19.000	18.500
Manganese Bronze	15.000	14.750	14.125
Muntz Metal	15.125	14.875	14.375
Naval Brass	14.875	14.625	14.125
Silicon Bronze	20.625	20.375	19.625
Nickel Silver, 10%	21.125	20.875	10.562
Phos. Bronze, A-5%	21.875	21.625	20.625

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, or any or all kinds of scrap, add 1 cent per lb.

7.00; crankcases, 10.50-11.00; industrial castings, 10.50-11.00.

Copper and Brass: No. 1 heavy copper and wire, 17.00-17.50; No. 2 heavy copper and wire, 15.00-15.50; light copper, 13.00-13.50; No. 1 composition red brass, 14.50-15.00; No. 1 composition turnings, 13.50-14.00; new brass clippings, 12.50-13.00; light brass, 8.50-9.00; heavy yellow brass, 10.00-10.50; new brass rod ends, 11.50-12.00; auto radiators, unsweated, 11.00-11.50; cocks and faucets, 11.50-12.00; brass pipe, 11.50-12.00.

Lead: Heavy, 8.25-8.75; battery plates, 3.50-3.75; linotype and stereotype, 10.50-11.00; electrotype, 9.50-10.00; mixed babbitt, 10.50-11.00.

Monel: Clippings, 28.00-29.00; old sheets, 25.00-26.00; turnings, 20.00-23.00; rods, 28.00-29.00.

Nickel: Sheets and clips, 42.00-45.00; rolled anodes, 42.00-45.00; turnings, 37.00-40.00; rod ends, 42.00-45.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 16.00-16.25; 3003 clippings, 16.00-16.25; 6151 clippings, 15.50-16.25; 5052 clippings, 15.50-15.75; 2014 clippings, 15.00-15.75; 2017 clippings, 15.00-15.75; 2024 clippings, 15.00-15.75; mixed clippings, 14.50-14.75; old sheets, 12.25-12.50; old cast, 12.25-12.50; clean old cable (free of steel), 15.25-15.50; borings and turnings, 12.75-13.75.
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 51.00; light scrap, 46.00; turnings and borings, 31.00.

Copper and Brass: No. 1 heavy copper and wire, 19.50; No. 2 heavy copper and wire, 17.50; light copper, 15.25; refinery brass (60% copper) per dry copper content, 17.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 19.50; No. 2 heavy copper and wire, 17.50; light copper, 15.25; No. 1 composition borings, 16.50; No. 1 composition solids, 17.00; heavy yellow brass solids, 11.50; yellow brass turnings, 10.50; radiators, 13.00.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 41.79; oval, 40.00, 5000-10,000 lb; electrodeposited, 31.25, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 10-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 112.50; 200-499 lb, 111.00; 500-999 lb, 110.50; 1000 lb or more, 110.00.

Zinc: Balls, 17.50; flat tops, 17.50; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums.
Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30; f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 68.40; 300-900 lb, 66.40; 1000-19,900 lb, 64.40.

Copper Sulphate: 100-1900 lb, 13.70; 2000-5900 lb, 11.70; 6000-11,900 lb, 11.45; 12,000-22,900 lb, 11.20; 23,000 lb or more, 10.70.

Nickel Chloride: 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400-9999 lb, 43.50; 10,000 lb or more, 40.50.

Nickel Sulphate: 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 75.20; 100-600 lb, 66.20; 700-1900 lb, 63.50; 2000-9900 lb, 61.60; 10,000 lb or more, 60.63.

Stannous Chloride (anhydrous): Less than 25 lb, 164.7; 25 lb, 129.70; 100 lb, 114.70; 400 lb, 112.20; 5200-19,600 lb, 100.00; 20,000 lb or more, 87.80.

Stannous Sulphate: Less than 50 lb, 127.50; 50 lb, 97.50; 100-1900 lb, 95.50; 2000 lb or more, 93.50.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 131)

major steel grades. They are offering $34-$36 for No. 1 heavy melting and No. 1 bundles, $31-$32 for No. 2 heavy melting, and $23-$24 for No. 2 bundles. Other prices are unchanged but are largely nominal on machine shop turnings, mixed borings and turnings, short shoveling turnings, and low phos structurals and plates. Stainless scrap prices are also nominal.

Pittsburgh—Leading open hearth grades of scrap have weakened here on purchases of No. 1 heavy melting at $35, and No. 2 bundles at $29. Prices are $1 to $3 a ton below last week's nominal quotations. Cut structurals and cupola cast, are developing a little strength. Stainless steel scrap prices continue to decline as major users remain out of the market. Adverse weather is slowing collections.

Bids close Feb. 26 on 27,000 tons of steel scrap (abandoned combat tanks), Letterkenny Ordnance Depot, Chambersburg, Pa.

Cleveland — The scrap market here and in the Valley is firm, with prices unchanged. Brokers and dealers report no new representative sales. They are closely watching the effect of resumption of iron production by two Valley blast furnaces. Some observers see their return as a move to hold the scrap market in check.

Youngstown — The local scrap market is being enlivened by several factors, including a recent sale of No. 1 heavy melting at prices ranging up to $38 a ton.

Much scrap is piled in district yards and most consumers are showing little disposition to buy important tonnage.

Detroit—There has been a slight flurry in the cast iron grades the last few days, but it appears to be largely dealer speculation. No firm orders have been placed. Local scrap brokers are not too optimistic for the immediate future. They anticipate no change in the scrap market situation with mill demand at a miminum and steel production curtailed. Area traders don't expect any noticeable improvement until the auto business picks up. Scrap dealers here are running into difficulty. One folded recently, and another is reported on the verge of bankruptcy.

Buffalo—Only one mill is active in the Buffalo scrap market. It has extended deliveries on its January orders through February. That means it is not placing new business this month, evidently being unwilling to pay above current price levels despite growing tightness in scrap supplies.

Cincinnati—The scrap market here is inactive, and prices are unchanged. The stronger tone noted recently is continuing despite the absence of active demand. Steel production continues depressed in the area, but scrap market interests think February will be the low month. Brokers are holding up deliveries to area foundries because of a strike. Operations at 22 district plants were halted. Many of the casting shops have been on three and four day weeks.

St. Louis—Brokers' buying prices on cast scrap have gone up slightly in response to increasing scarcity. The melting grades are unchanged, but prices are expected to rise soon to check the outflow of material from the district. Bad weather is hampering railroad maintenance work. Railroad scrap offerings have been curtailed. The first offering in a month was by the Frisco late last week. It involved only 1000 tons.

Birmingham—Though consumers

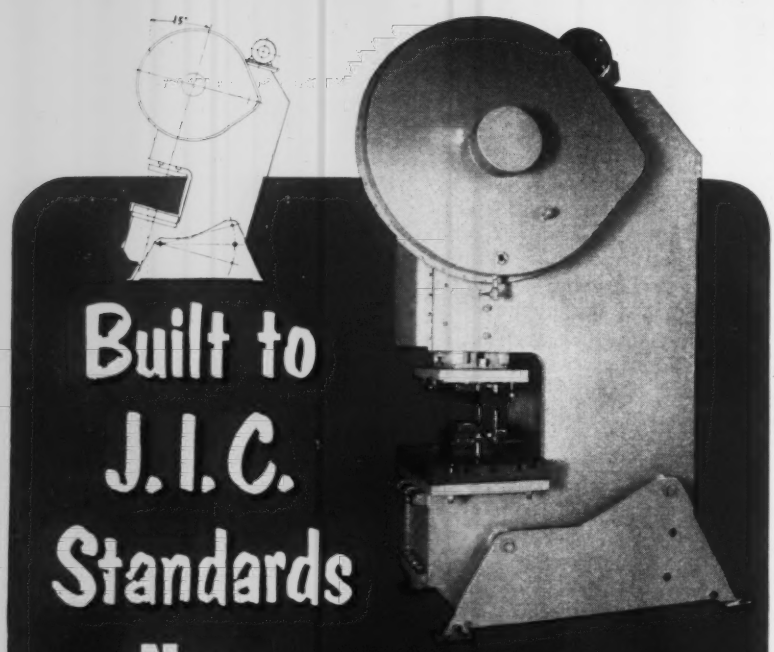
CLASSIFIED

REPRESENTATIVES WANTED
Manufacturers agent needed for contacting users of fabricated metal stampings along Eastern Seaboard. AAA1 rated company with top facilities located central states. Send qualifications, territory covered and other lines handled to Box 639, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

POSITION WANTED: With aggressive ornamental iron, aluminum and stainless steel fabricator; capable of assuming complete charge of and co-ordinating sales, estimating and engineering departments in the above metals or structural steel. Thirty years continuous experience with top companies. Age 50 years, neat appearance and good health. Could be available in 60 days. Write Box 638, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANT TO BUY
Steel By-Products Discs
2" to 2½" Diameter .060 to .125
4½" Diameter .060 to .125
6½" to 10" Diameter .060 to .125
11" to 12½" Diameter .085 to .095
Hot or Cold Rolled
KEYSTONE LAMP MFG. CORP.
Purchasing Department
Phone Slatington, Pa. POrter 7-3821



Built to J.I.C. Standards

New OLIVER-FARQUHAR OBI Mechanical Gap Press

Only a press which is completely new from top to bottom can meet the exacting requirements of Joint Industry Conference Standards. That is what you get in this new Oliver-Farquhar OBI Mechanical Gap Press. Sturdy full-length guides increase your tool and die life. J. I. C. bolster plates with J. I. C. T-slots and centers make it possible to change dies from one press to another without difficult adjustments.

Slide adjustment screw, easily accessible from floor-level, makes climbing unnecessary. Cooler operating, low inertia clutch permits higher cycling and reduces maintenance to a minimum.

Because it has all these new features and because it is designed and built to J. I. C. Standards, the new Oliver-Farquhar OBI Gap Press will assure the continuous operation of your production line. There is real cost-saving efficiency built into this press for your forming, blanking, drawing, bending and assembling operations.

Available in four capacities—75, 110, 150 and 200 ton.

Write, wire or phone for complete descriptive circular, prices and delivery dates.

A. B. FARQUHAR DIVISION
The Oliver Corporation
Press and Special Machinery Department
York 58, Pennsylvania

OLIVER *Farquhar* **PRESSES**

Also Manufacturers of Hydraulic Presses and Conveyors

continue to take only small tonnages of scrap, district dealers are bullish, as shown by the favorable prices they bid on about 25,000 tons of unprepared tanks offered by the Anniston, Ala., Ordnance Depot.

Seattle—The scrap market here is unchanged. Yards are practically idle with turnover at a minimum and receipts light. The mills are well stocked. Consequently, they are not placing new orders.

Export interest has not revived but shippers are looking hopefully to Japan for tonnage orders.

Los Angeles—Prices continue to decline, particularly on the secondary grades. Some dealers say collections are at an all-time low.

San Francisco—The steel scrap market here is marking time with no indication as to when it may come out of the slump.

Pig Iron . . .

Pig Iron Prices, Page 126

Demand for merchant iron is sluggish. Some producers are predicting a further downturn in foundry operations in the weeks immediately ahead. They hope for improvement in the second quarter, but prospects are not encouraging.

Cast pipe shops, including pressure and soil pipe fabricators, are operating at a little higher rate as spring approaches. Otherwise, foundry operations are averaging no more than three to four days a week.

Republic Steel Corp. has resumed operation of a blast furnace in Canton, Ohio, and another one in Youngstown. The Canton furnace had been banked since late December. It has a daily capacity of 760 tons. The stack at the Youngstown Works was banked early in December. About 150 employees have been recalled. The furnace has a daily capacity of 1160 tons.

Production of pig iron in the Buffalo district remains surprisingly high in view of slow merchant demand.

Semifinished Steel . . .

Semifinished Prices, Page 121

Columbia-Geneva Steel Div., U. S. Steel Corp., has closed down another open hearth at its Provo, Utah Works. Idled employees at the plant now number 580.

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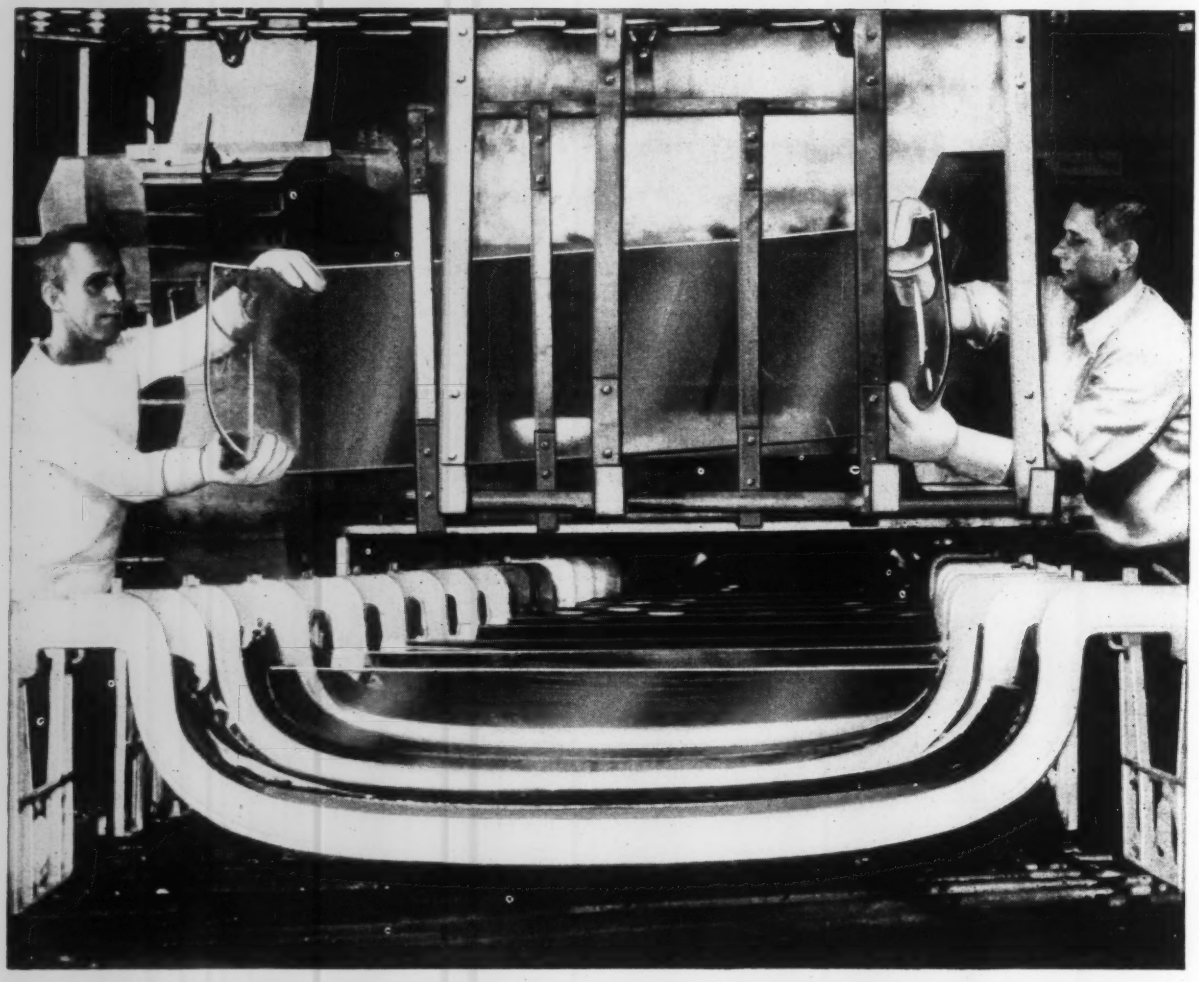
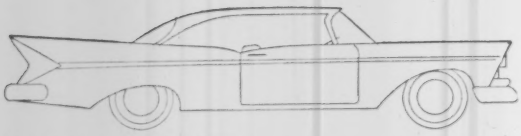
TO FIND THE MAN YOU NEED . . .

Place an advertisement in the "Help Wanted" columns of STEEL's classified pages. Your advertisement will reach the qualified men you need, because STEEL is addressed to highly-trained men in all phases of metalworking

STEEL
The Metalworking Weekly



Greater visibility, trimmer lines in new car styling... thanks to GAS



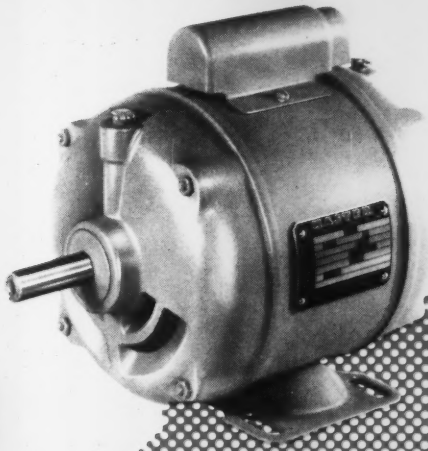
With nearly 7,000,000 cars being produced annually, the increased use of glass has demanded major production improvements in the manufacture of new panoramic windshields and back-lights.

Since the forming of the intricately curved glass is done at a temperature at which glass is soft and can be bent, the production process challenged heat process engineers to design new automatic equipment capable of mass producing these large precision glass pieces.

Selas engineers, working with the nation's leading glass manufacturer, discovered that Gas could produce the proper time-temperature cycle demanded by this process, efficiently, quickly, reliably. The flat glass is conveyed under radiant Gas burners which bring the glass quickly up to bending temperature and allow the shaping of windshields, with reproducible uniformity, at high production rates.

The production of this wrap-around windshield is another example of the contributions modern Gas equipment is making to American manufacturing. If you have an operation demanding precise process heating, call your local Gas Company's Industrial Specialist and discuss the economies and results you, too, can get with modern Gas equipment. *American Gas Association.*

See Playhouse 90 with Julia Meade on CBS-TV. Watch local listings for time and station. Sponsored by your Gas Company and the Gas Industry.



FOR 1/8 THRU 400 H. P. MOTORS

...see Master

All Enclosures—Most Types—Integrated Drives.

You get a great big plus value with Master motors—fractional and integral H.P. And that is that every one of them is engineered to meet your drive requirements *exactly*—to combine, if desired, in one tidy, efficient package with other Master components.

So for any drive requirement—simple or complex—a glance at the data below will show you that Master is your best bet. Let us tell you more.

Motor Ratings .....⅛ to 400 H.P. All phases, voltages, and frequencies.

Motor Types .....Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.

Construction .....Open, enclosed, fan-cooled, explosion-proof, special purpose.

Speeds .....Single-speed, multi-speed, and variable speed.

Installation .....Horizontal or vertical, with or without flanges and other features.

Power Drive Features .....Electric brakes (2 types)—5 types of gear reduction up to 432 to 1 ratio. Mechanical and electronic variable speed units—fluid drives—every type of mounting.

THE MASTER ELECTRIC COMPANY • Dayton 1, Ohio

DIVISION OF RELIANCE ELECTRIC AND ENGINEERING CO.

Puts squeeze on steel tubes...

TIMKEN® bearings put squeeze on costs

TO keep production high, downtime low, Aetna-Standard Engineering Company mounted the roll necks of their 16-stand tube stretch reducing mill on Timken® tapered roller bearings. One of the few of its kind in the world, this new mill, in operation at Jones & Laughlin Steel Corporation — Aliquippa Works, uses varying-speed rolls to reduce diameter and wall thickness of steel tubes.

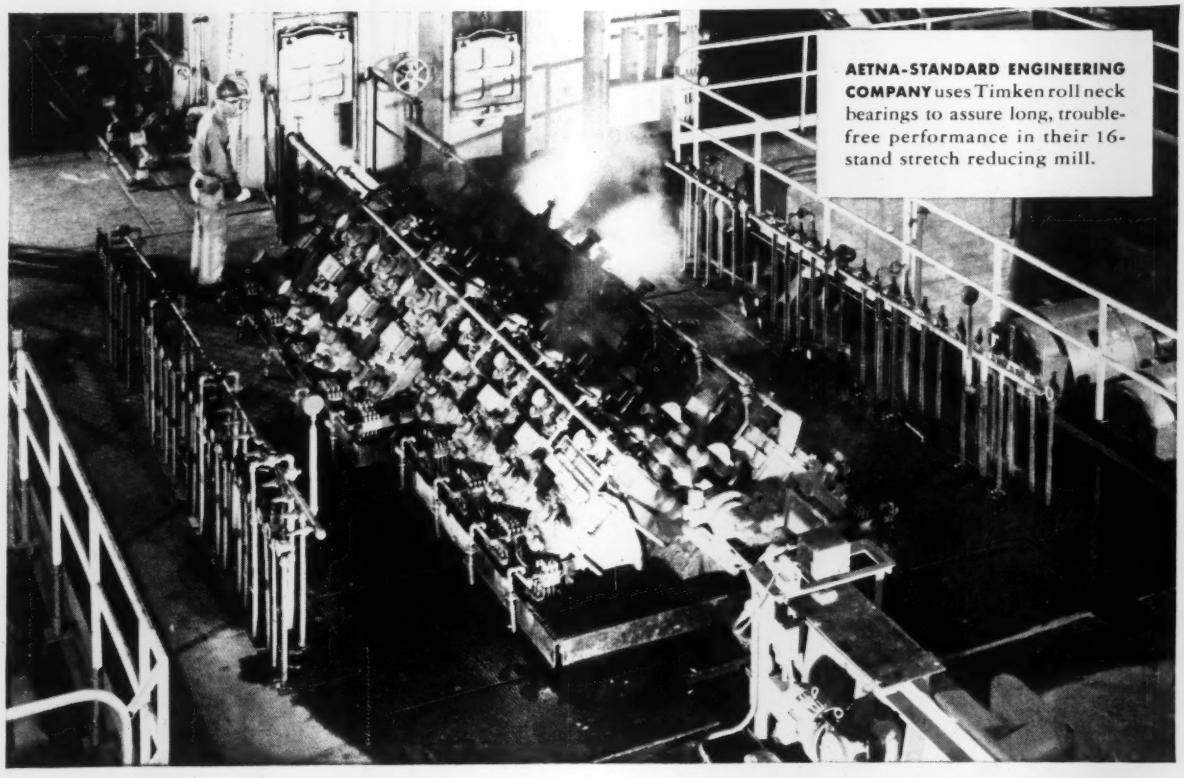
Timken roll neck bearings give longer, trouble-free service because their balanced proportion design provides maximum bearing capacity in available space. And balanced proportion design means greater mill rigidity. With Timken bearings roll neck strength is increased 50% to 60% and load ratings up to 40%. Their tapered design enables them to take radial and thrust loads or any combination. No expensive thrust devices are needed.

Mills with Timken bearings can be started under full load. No steel is wasted because of disturbed gauge settings. Higher rolling speeds are possible because Timken bearings are designed for economical grease lubrication. Rolls can also be changed faster.

Why not get all these advantages in the machines you buy or build? Or in existing machines? Timken balanced proportion roll neck bearings can reduce downtime, cut costs for you, too. For full information, consult our roll neck specialists. Write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



AETNA-STANDARD ENGINEERING COMPANY uses Timken roll neck bearings to assure long, trouble-free performance in their 16-stand stretch reducing mill.

TIMKEN

TAPERED ROLLER BEARINGS ROLL THE LOAD